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INCLUDING

CEYLON AND BURMA

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HYMENOPTERA.—Vol. I.

WASPS AND BEES.

BY

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INTRODUCTION.

HYMENOPTERA.

The Order Hymenoptera comprises the Sawflies, the Gallflies, the Ichneumons, the Ants, the Sand- and Wood-wasps, the Wasps proper, and the Bees.

It is now generally admitted that Hymenoptera have a right to be considered the most highly developed mentally of all insects. Certain forms, as the ants, the social bees, and wasps, live in large communities, have a regular and organized division of classes and labour, and frequently maintain complex social relations with insects of other orders that, as guests or parasites, harbour in their nests.

The Hymenoptera are distinguished from all other insects by the following general characters:—

Mandibles always present and conspicuous, even when the rest of the oral parts are more or less changed and abnormal. In the higher forms, the thorax and abdomen are remarkably modified. The first segment of the abdomen is separated from the remaining segments by a complex and extremely flexible joint, and is united to the posterior portion of the thorax, forming with it a consolidated mass, which has appropriately been called the "alitrunk" by Dr. Sharp. Wings four, membranous, with comparatively few nervures, enclosing spaces or cells irregular in shape and limited in number; the posterior wings smaller than the anterior. Abdomen in the female furnished, at its apex, with a saw, borer, ovipositor, or sting.

Larva in the more highly developed genera and families always vermiform and footless, but in some of the lower forms with thoracic and abdominal legs, the latter frequently numerous. Pupa inactive, the parts as in the imago, but more or less colourless and enveloped in a thin delicate membrane.

The *head* of a hymenopterous insect is quite free from the thorax and often remarkably mobile. It varies but little in shape: the *vertex* (figs. 1, 2, & 3, *a*) is usually more or less convex and transverse, very often broad and subquadrate; the *cheek* (fig. 1, *b*) lies behind the eye, and when the lower rim of the latter does not extend down to the base of the mandibles it includes the space between the eyes and the mandibles; the *compound eyes* (fig. 1, *c*; figs. 2 & 3, *d*, *d*) occupy the sides of the head, and are built up generally of many facets, but in some of the ants are reduced to one facet. On the vertex (sometimes a little below it) are placed

the simple eyes or *ocelli* (figs. 2 & 3, *b*), three in number; these may be present or absent, complete, or distorted as in some of the *Sphegidæ*. Below the vertex is the *front* (figs. 2 & 3, *c*), on which are inserted the *antennæ* (fig. 1, *d–f*; figs. 2 & 3, *e–f*). The parts of the antenna are the scape (fig. 1, *d*; figs. 2 & 3, *e*, *e*) and the flagellum (fig. 1, *e–f*; figs. 2 & 3, *f*, *f*). The *scape* or basal joint of the antenna is sometimes elongate as in the *Heterogyna* or Ants:

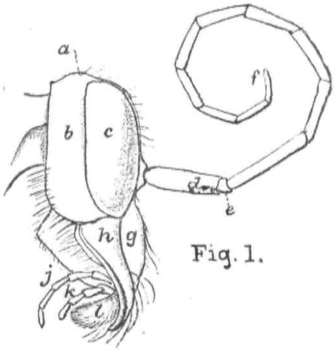

Fig. 1.

Fig. 1.—*Salius aureosericeus*. Side view of head much enlarged.—*a*, vertex; *b*, cheek; *c*, compound eye; *d*, scape of antenna; *e–f*, flagellum of antenna; *g*, clypeus; *h*, mandible; *j*, maxillary palpus; *k*, labial palpus; *l*, portion of maxilla.

the *flagellum* is, as a rule, divided into eleven joints in the female and twelve in the male; the apical joint or joints in the latter sex being sometimes more or less modified, *e. g.*, curved into a hook as in some of the *Diploptera*, spined and excavate below as in some of the *Fossores* (*Bembex*), or dilated and flattened as in a few of the *Anthophila*. Below the base of the antennæ is a more or less conspicuous and shield-like plate called the *clypeus* (figs. 1, 2, & 3, *g*), the form of which affords valuable specific or, sometimes, generic characters. Beneath the clypeus and hinged on to its anterior margin is the *labrum* (figs. 2 & 3, *h*): this is variable in size and form, and is frequently entirely concealed underneath the clypeus, while in a few genera it is exserted and elongate to an extraordinary extent. The part underneath the labrum is the *epipharynx*. The *mandibles* (fig. 1, *h*; figs. 2 & 3, *i*, *i*) are hinged to the apex of the cheeks below and fold over or under the labrum; under all modifications in size and shape they remain conspicuously cutting or crushing machines. On the underside of the lower or face portion of the head is a hollow into which fit the softer mouth-parts when at rest. These latter consist chiefly of the labium and the maxillæ (figs. 4 & 5). The *labium* is attached to the side walls of the buccal hollow, through narrow joints, the *lora* and the *cardines*. The upper portion of the labium forms the *submentum* and *mentum*; from the apex of the latter at the sides spring the *labial palpi* (fig. 4, *k*, *k*), and from

between the labial palpi, the *ligula* or tongue (fig. 4, *m*), ensheathed at base by the *paraglossæ* (fig. 4, *l*, *l*). Both the ligula and paraglossæ are very variable in form. On each side of the labium are the *maxillæ* (fig. 5), sheath-like organs with a basal portion, the *stipes* (fig. 5, *n*), and an apical lobe, the *galea* (fig. 5, *p*).

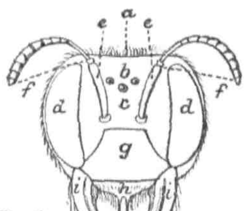

Fig.3.

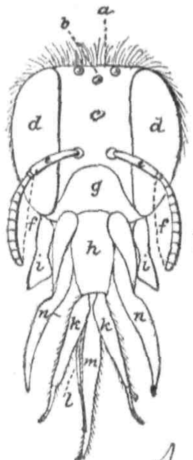

Fig. 2.

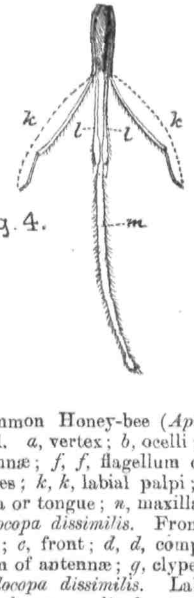

Fig. 4.

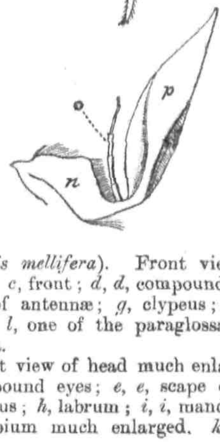

Fig. 5.

Fig. 2.—Common Honey-bee (*Apis mellifera*). Front view of head much enlarged. *a*, vertex; *b*, ocelli; *c*, front; *d*, *d*, compound eyes; *e*, *e*, scape of antennæ; *f*, *f*, flagellum of antennæ; *g*, clypeus; *h*, labrum; *i*, *i*, mandibles; *k*, *k*, labial palpi; *l*, one of the paraglossæ of the tongue; *m*, ligula or tongue; *n*, maxilla.

Fig. 3.—*Xylocopa dissimilis*. Front view of head much enlarged. *a*, vertex; *b*, ocelli; *c*, front; *d*, *d*, compound eyes; *e*, *e*, scape of antennæ, *f*, *f*, flagellum of antennæ; *g*, clypeus; *h*, labrum; *i*, *i*, mandibles.

Fig. 4.—*Xylocopa dissimilis*. Labium much enlarged. *k*, *k*, labial palpi; *l*, *l*, paraglossæ; *m*, ligula.

Fig. 5.—*Xylocopa dissimilis*. Maxilla much enlarged. *n*, stipes; *o*, maxillary palpus; *p*, galea.

Close to the junction of the stipes with the galea springs the *maxillary palpus* (fig. 5, *o*). The form and structure of the mouth-parts are of great value in the classification of the Hymenoptera.

The *thorax* proper is composed of three segments—the pro-, meso-, and metathorax. The *prothorax* is remarkable for the

detachment of the side pieces (fig. 8, *a*, *a*) from the notum and their great development. In many species these side pieces completely overlie the prosternum. The *mesothorax* consists of a broad, generally convex plate, the *mesonotum* (fig. 6, *c*, & fig. 7, *b*); a posterior portion, the *scutum* or *scutellum* (fig. 6, *h*, & fig. 7, *f*);

Fig. 6.

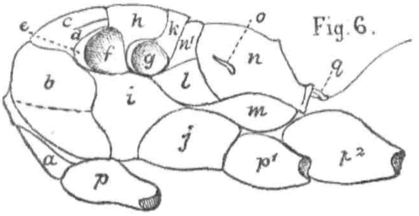

Fig 7.

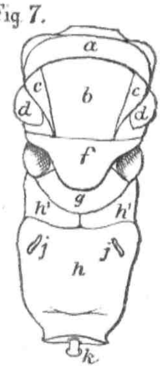

Fig. 8.

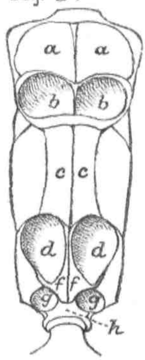

Fig. 6.—*Salius aureosericeus.* Side view of alitrunk or thorax and median segment, much enlarged. *a*, prosternum; *b*, pronotum; *c*, mesonotum; *d*, parapside of mesonotum; *e*, tegula; *f*, site of articulation of fore wing; *g*, site of articulation of hind wing; *h*, scutellum; *i*, episternum; *j*, epimeron (*i* & *j* united form the mesopleuron); *k*, postscutellum or anterior portion of metanotum; n^1, posterior portion of metanotum; *l*, episternum; *m*, epimeron (*l* & *m* united form the metapleuron); *n*, 1st true abdominal segment, the median segment or propodeum; *o*, false stigmata; *p*, p^1, p^2, coxæ of legs; *q*, funiculus.

Fig. 7.—Thorax seen from above. *a*, pronotum; *b*, mesonotum; *c*, *c*, parapsides of mesonotum; *d*, *d*, tegulæ of fore wings; *f*, scutellum; *g*, postscutellum; h^1, h^1, posterior portion of metanotum; *h*, median segment; *j*, *j*, false stigmata; *k*, funiculus.

Fig. 8.—Thorax from below. *a*, *a*, side pieces of prothorax overlying the prosternum; *b b*, *d d*, *g g*, sites of articulation of the legs; *c*, *c*, mesosternum; *f*, *f*, metasternum; *h*, ventral plate of median segment.

side pieces, the *episternum* (fig. 6, *i*) and *epimeron* (fig. 6, *j*), these two united making up the *mesopleuron*; and lastly the *mesosternum* (fig. 8, *c*, *c*). The mesonotum is frequently divided by oblique longitudinal grooves, the side pieces being called the *parapsides* (fig. 6, *d*, & fig. 7, *c*, *c*). The *metathorax* similarly has

a dorsal plate, the *metanotum* (fig. 6, *k*, *n*'; fig. 7, *g*, *h*', *h*'), the anterior portion of which is called the postscutellum; side pieces, *episternum* (fig. 6, *l*) and *epimeron* (fig. 6, *m*), the two together forming the *metapleuron*; and the *metasternum* (fig. 8, *f*, *f*).

In all the higher Hymenoptera, as noted above, the basal segment of the abdomen is closely amalgamated with the metathorax (fig. 6, *n*, & fig. 7, *h*). This segment has been variously called "Latreille's segment," the "propodeum," or the "median segment."

Throughout this work I have preferred to use the term "median segment" as being most generally known. The *median segment* has very often short oblique lateral slits or grooves with their anterior edge raised and prominent: these slits or grooves are the so-called "false stigmata" (fig. 7, *j*, *j*). The ventral plate of the median segment (fig. 8, *h*) can generally be made out with but little difficulty. The sculpture of the thorax and of the median segment is largely used in the discrimination of the species.

The appendages of the thorax are the legs and the wings. The *legs*, as in all insects, are six in number, attached to the underside of the thorax by their basal joints, the *coxæ* (fig. 9, *a*): the fore legs are articulated to the prothorax, the intermediate pair to the mesothorax, and the posterior to the metathorax. Below the coxæ are the *trochanters* (fig. 9, *b*): these may be simple, in one piece, as in the bulk of the *Aculeata*, or in two with an articulation between, as in most of the *Parasitica*. Articulated to the trochanters below are the *femora* (fig. 9, *c*); below these the *tibiæ* (fig. 9, *d*), and below the tibiæ the *tarsi* (fig. 9, *f*). The *tarsus* in Hymenoptera is 5-jointed, with very few exceptions: the basal joint (fig. 9, *g*) or metatarsus is usually the longest, the apical joint (fig. 9, *l*) is invariably provided with two claws (fig. 9, *m*, *m*), which may be simple, bifid, or dentate beneath. Between the claws lies the pad or *pulvillus*, which, however, is absent in many genera.

The legs of Hymenoptera, especially the tibiæ and tarsi, are as a rule more or less furnished with spines, stiff hairs, or pubescence of some kind, the presence or absence and disposition of which afford valuable characters for the discrimination of species and even of genera.

The *wings* (figs. 10 and 11) are invariably four in number, and nearly always present in the imago in both sexes. The females, and more rarely the males in a few forms, are apterous. Among the *Heterogyna*, or Ants, the fully-developed females and the males only are provided with wings, the neuters or workers (more correctly the females with arrested development) being apterous. The anterior wings are attached to the sides of the mesothorax (fig. 6 *f*, *site of attachment of fore wing*), and the points of junction are protected and covered by little plates or shields, the *tegulæ* (fig. 6, *e*; fig. 7, *d*, *d*). The posterior wings are borne by the metathorax, and their points of junction with the thorax are slightly lower in a vertical direction than those of the fore wings.

The wings, as already stated above, are membranous, divided by nervures into irregular spaces or cells which in the fore wing are never more than twenty in number, and in the hind wing fifteen.

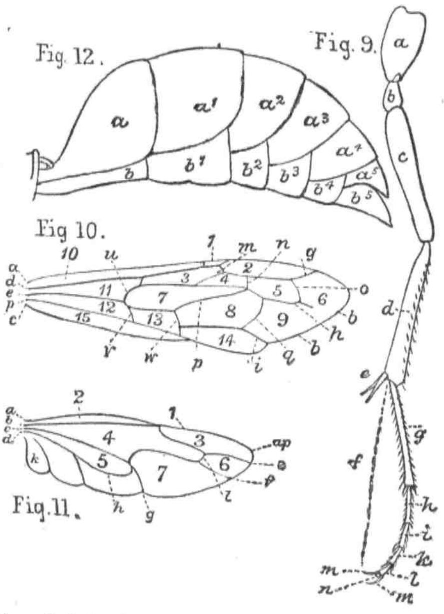

Fig. 9.—Hind leg of *Salius aureosericeus*. *a*, coxa; *b*, trochanter; *c*, femur; *d*, tibia; *e*, tibial calcaria; *f*, tarsus; *g*–*l*, joints of tarsus; *m*, claws; *n*, pulvillus.

Fig. 10.—Fore wing. *a*, anterior margin; *b*, apical margin; *c*, posterior margin; *d*, postcostal nervure; *e*, externo-medial nervure; *f*, anal nervure; *g*, radial nervure; *h*, cubital nervure; *i*, discoidal nervure; *m*, *n*, *o*, 1st, 2nd, and 3rd transverse cubital nervures; *p*, *q*, 1st and 2nd recurrent nervures; *u*, basal or medial nervure; *v*, *w*, 1st and 2nd transverse subbasal, or submedial nervures: 1, stigma; 2, radial cell; 3, 4, 5, and 6, cubital cells; 7, 8, 9, discoidal cells; 10, costal cell; 11, basal or medial cell; 12, 13, subbasal or submedial cells; 14, apical cell; 15, anal cell.

Fig. 11.—Hind wing. *a*, anterior or costal margin; *b*, postcostal nervure; *c*, medial nervure; *d*, anal nervure; *e*, radial nervure; *f*, cubital nervure; *g*, discoidal nervure; *h*, transverse anal nervure; *k*, anal lobe; *l*, transverse cubital nervure: 1, site of the hamuli or little hooks which catch on to the fore wing during flight; 2, costal cell; 3, radial cell; 4, medial cell; 5, anal cell; 6, cubital cell; 7, discoidal cell.

Fig. 12.—Abdomen, ♀. a, a^1, a^2, a^3, a^4, a^5, dorsal segments; b, b^1, b^2, b^3, b^4, b^5, ventral segments.

The winged Hymenoptera are, as a rule, capable of swift and sustained flight. For this purpose they possess a wonderful arrangement (one of the most beautiful in nature) for linking

together during flight the fore and hind wings. Examined with a good lens, the fore wing is seen to have a fold along its posterior margin, while on the anterior or costal margin of the hind wing a row of hook-shaped bristles or hairs can be easily detected. When the wings are expanded these hooks, or *hamuli* as they are called, catch on firmly to the fold in the fore wing, and the fore and hind wing on each side are enabled to act in concert, having the appearance and all the firmness of a single expanded membrane. The names of the nervures and cells in the wings are included in the explanation under figures 10 and 11. The number and disposition of these nervures and cells are of considerable importance in the classification of the Hymenoptera.

The *abdomen* (fig. 12) is attached to the thorax direct or through the median segment, the articulation being either broad and not very flexible, as in the lower forms, or narrow and possessed of the utmost flexibility, as in the bulk of the families into which the Hymenoptera are divided. So remarkable is this flexibility, that a bee or a wasp is not only able to twist its abdomen and sting in all directions posteriorly, but many species can, and do, double the abdomen underneath the thorax, and protrude the sting in front of the head.

As a rule the abdomen, in the higher Hymenoptera, consists of six visible segments in the female and of seven segments in the male, each segment formed by a dorsal and a ventral plate (fig. 12, a–a^5, b–b^5).

The *epipygium*, or dorsal portion of the apical abdominal segment, and the *hypopygium*, or ventral portion of the same, together form what is called the *pygidium*. Occasionally the term "pygidial area" is used, and refers to a portion of the epipygium which in certain forms is margined and flat, not convex *.

The Hymenoptera fall naturally into two great divisions or suborders, characterized by the difference in the articulation of the abdomen with the thorax referred to above, and by more profound differences in the form and life-history of the larvæ. The external difference in the imago may be tabulated as follows :—

I. Suborder SESSILIVENTRES.

Median segment (1st true abdominal segment) not completely amalgamated with the thorax, the joint between the thorax and abdomen broad.

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* For an accurate and full account of the external and internal anatomy of the Hymenoptera, see the 'Cambridge Natural History,' Vol. V., Part Insecta, by Dr. D. Sharp.

II. Suborder PETIOLATA.

Median segment (1st true abdominal segment) completely amalgamated with the thorax; joint between the thorax (including the median segment) and the abdomen slender, highly mobile.

Fig. 13.
Hylotoma, sp.? $\frac{1}{1}$.

A good representative form belonging to the Suborder *Sessiliventres* is shown at fig. 13. This is an undescribed species, from Sikhim, of the genus *Hylotoma* belonging to the family *Tenthredinidæ* or Sawflies.

The Suborder *Petiolata*, containing by far the larger number of the families in the Order, can be subdivided into the

(1) PARASITICA.—Trochanters of the legs in two portions with an articulation between: female furnished with an ovipositor.

(2) ACULEATA.—Trochanters undivided; female furnished with a sting.

The character derived from the trochanters is liable to exceptions. Some of the *Ichneumonidæ*, which belong to the division PARASITICA, have undivided trochanters; while on the other hand some of the *Sphegidæ* (*e. g.*, the genus *Nysson*), true aculeates, are markedly ditrochous.

The wing-neuration in the *Ichneumonidæ*, however, is generally so marked that, with a little care, confusion between the forms in the different divisions can be avoided.

Fig. 14.—*Ichneumon* sp.?, ♀. $\frac{1}{1}$.

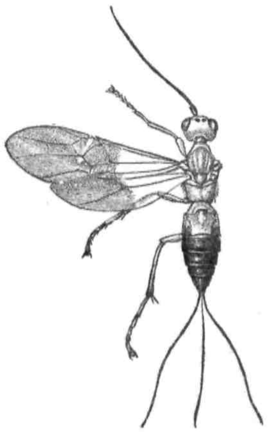

Fig. 15.—*Bracon deceptor*, Sm., ♀. $\frac{1}{1}$.

Figures 14 and 15 show representative Indian examples of the PARASITICA belonging to the families *Ichneumonidæ* and *Braconidæ*.

The ACULEATA have been divided into Series or Tribes. All divisions, however, more comprehensive than families must be considered more or less conventional.

Key to the Tribes of the Aculeata.

A. Apical abdominal segments highly retractile; abdomen with only three, four, or five visible segments; wings when at rest without a longitudinal fold	**TUBULIFERA.**
B. Apical abdominal segments not so retractile; abdomen generally with six (♀) or seven (♂) visible segments; wings when at rest with or without a longitudinal fold.	
a. Hairs not plumose or branched; basal joint of posterior tarsi not dilated.	
a'. Wings when at rest without a longitudinal fold.	
a^2. Petiole of abdomen with one or more scales or nodes: species social	**HETEROGYNA.**
b^2. Petiole of abdomen simple: species solitary	**FOSSORES.**
b'. Wings when at rest with a longitudinal fold	**DIPLOPTERA.**
b. Hairs of the thorax plumose or branched; basal joint of posterior tarsi more or less dilated	**ANTHOPHILA.**

The present volume takes in only the *Fossores*, *Diploptera*, and *Anthophila*.

Key to the Families of the Fossores.

A. Posterior lateral angles of pronotum produced back to the base of the wings.	
a. A deep constriction between 1st and 2nd ventral segments of abdomen.	
a'. Intermediate coxæ contiguous: ♀ apterous.	**Mutillidæ.**
b'. Intermediate coxæ widely separated: ♀ winged	**Scoliidæ.**
b. No constriction between 1st and 2nd ventral segments of abdomen.	
a'. Posterior legs short, not reaching much beyond apex of abdomen.	
a^2. Eyes emarginate on inner side: ♀ winged	******Sapygidæ.*
b^2. Eyes not emarginate on inner side: ♀ apterous	**Thynnidæ.**
b'. Posterior legs long, reaching well beyond apex of abdomen; eyes not emarginate on inner side	**Pompilidæ.**
B. Posterior lateral angles of pronotum not produced back to base of the wings; pronotum often forming a mere collar	**Sphegidæ.**

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* **Not known to occur in India.**

Key to the Families of the Diploptera.

A. Intermediate legs armed with one tibial calcar; claws of tarsi bifid or dentate: species solitary	**Eumenidæ.**
B. Intermediate legs armed with two tibial calcaria; claws of tarsi simple: species social .	**Vespidæ.**

Key to the Families of the Anthophila.

A. Tongue short, obtuse, emarginate or bifid at apex	**Colletidæ.**
B. Tongue short and acute, or long (sometimes very long) and acute, never emarginate	**Apidæ.**

The arrangement of the Hymenoptera in this volume, so fa as the primary divisions go, is based on the classification adopte by Dr. D. Sharp in the Cambridge Natural History volume o *Peripatus*, Myriapods, and Insects. In the divisions of th Aculeate section of the suborder *Petiolata* I have followed, wit certain modifications, the arrangement given in Mr. E. Saunder valuable work on the Hymenoptera Aculeata of the Britis Islands. With regard to the *Anthophila*, I agree with Mr Saunders that the distinction between the bees with obtus emarginate tongues and the bees with acute non-emarginate o simple tongues is of greater importance than the distinctio between the usually accepted divisions of the tribe, *Andrenid* and *Apidæ*. On the other hand, I have preferred to place th whole of the bees with acute tongues under the family *Apidæ*, a there seems to me no choice between this and dividing the into several families or subfamilies, as proposed by Schmiedeknecht Dalla Torre, and others.

The present volume appears under the disadvantage of bein the first attempt at describing the Wasps and Bees of Indi as a whole; no complete list even has hitherto been published nor have the Hymenoptera received nearly as much attentio from Indian naturalists as the Lepidoptera. Whilst, therefore it may be hoped that this book will direct the attention of observers and collectors in India to a most interesting thoug somewhat neglected order of insects, and that it will facilitate th identification of the species which occur, it must be remembere that not only is our general knowledge of the Indian Hymenoptera very incomplete, but our information as to the distributio of the species hitherto recorded is singularly imperfect. Fo many of the species described in the following pages no mor exact locality is known than "India." Some species to which a Indian origin was erroneously assigned by the older writers ar omitted in the present work, and it is probable that a few mor

here included may not occur within the area now under British rule, but the majority of the forms recorded as Indian have doubtless been obtained from some part of India, Ceylon, or Burma, and it is to be hoped that all these will be rediscovered and the area they inhabit precisely determined.

The few species of which I have been unable to examine specimens are distinguished by an asterisk prefixed to the serial number, thus *960.

For material I have had my own large collections, made partly in the North-West Provinces, and during one season in Sikhim, but chiefly during the last twelve years in Burma and Tenasserim.

I have to thank the Authorities of the British Museum for free access to the rich collections contained in the Natural History Museum at South Kensington. To Dr. P. Magretti, of Milan, Dr. R. Gestro, of the Museo Civico, Genoa, and Mons. E. André, of Gray, Haute-Saône, France, my warmest acknowledgments are due for the generous loan of many types and specimens. Above all, however, I am indebted to Mr. G. A. James Rothney, who very generously placed at my disposal the whole of his large and varied collection made during several years' residence in Bengal and the North-West Provinces of India. I have to thank also Miss A. Brook, Col. Yerbury, Mr. F. Möller, Mr. E. E. Green, Mr. W. D. Cumming, Mr. T. A. Hauxwell, Mr. A. Weston, and other friends, for very kindly sending to me collections of Hymenoptera from various parts of India, Burma, and Ceylon.

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TRIBE **FOSSORES.**

Family MUTILLIDÆ.

The insects belonging to this family have been called "Solitary Ants." With the true ants, however, they have no very close affinity, but belong to the Fossores. The sexes, ♂ and ♀, are solitary; there are no neuters. The ♂ is winged; the pronotum is produced back at its lateral angles to the base of the wings; the fore wing has at least one closed cubital cell; the 1st discoidal cell is always shorter than the 1st submedial cell, and the apex of the abdomen is armed with one or more spines or blunt teeth. The ♀ is apterous, has the legs stout, fitted for digging; the tibiæ spinose, the tarsi ciliated, the basal joint of the latter cylindrical and not pubescent on the inside.

Key to the Genera.

a. Abdomen in ♀ and ♂ with deep constrictions between 1st and 2nd, and 2nd and 3rd segments..................	1. APTEROGYNA, p. 1.
b. Abdomen in ♀ and ♂ with no such constriction, or if constricted the constriction only between the 1st and 2nd segments	2. MUTILLA, p. 2.

Genus **APTEROGYNA.**

Scolia, part., *Fabr. Ent. Syst.* ii, p. 228 (1793).
Apterogyna, *Latr. Gen. Crust. Ins.* iv, p. 121 (1809).

Type, *A. olivieri*, Latr.
Range. India and Africa.

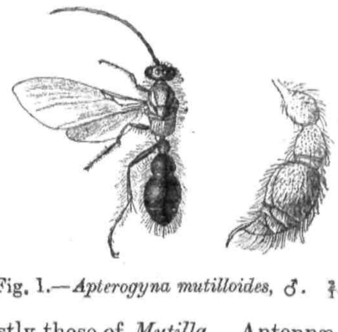


Fig. 1.—*Apterogyna mutilloides*, ♂. $\frac{2}{1}$.

Characters mostly those of *Mutilla*. Antennæ setaceous, nearly as long as the head and body united; scape elongate; mandibles arched, subdentate; abdomen with the 1st and 2nd segments

nodiform; ocelli (♂) prominent, placed in a triangle on vertex; wings (♂) moderately broad, fore wing with the cells much reduced, well removed from the apical margin, only one cubital cell; anal segment of abdomen in ♂ with an up-curved spine.

1. **Apterogyna mutilloides,** *Smith, Cat.* iii, p. 64, ♀ ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 137.

♀. Head, thorax, and abdomen very coarsely punctured, the punctures running into longitudinal coarse striæ on the posterior portion of the pronotum and on the abdomen. Black, the antennæ, the vertex and front of the head, the occiput, thorax, and 1st abdominal segment red; the legs obscurely dark chestnut-red; the whole head, thorax, and abdomen covered with glistening silvery white hairs.

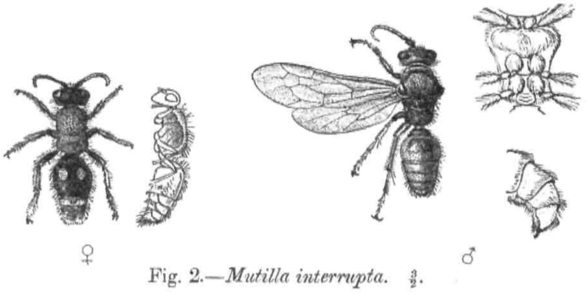
♂. Similar in colour, with similar pubescence, but the head nearly black; the antennæ longer, more filiform, and darker: the pubescence on the apical segments of the abdomen more dense; wings hyaline, lightly fuscous, with a brownish tint.

Hab. India (*Smith*); Allahabad, North-West Provinces. ♀. *Length* 17 mm. ♂. *Length* 12; *exp.* 22 mm.

Genus MUTILLA.

Mutilla, *Linn. Syst. Nat.* i, p. 966 (1767).
Tiphia, pt., *Rossi, Faun. Etrusc.* ii, p. 68 (1790).

Type, *M. europæa*, Linn.
Range. Both hemispheres.



♀ ♂

Fig. 2.—*Mutilla interrupta.* $\frac{3}{2}$.

♀. Head orbicular, sometimes subquadrate; eyes generally small and round; ocelli absent; antennæ subfiliform, rarely setaceous, inserted low down just above the very short clypeus, their bases moderately wide apart; clypeus generally small; mandibles unidentate as a rule; thorax more or less rectangular, or quadrate, sometimes oval, occasionally much narrowed and compressed anteriorly or posteriorly; legs short, robust, spinose; abdomen ovate, 1st segment subpyriform, occasionally narrowed and petiolate, furnished beneath with a carina, which is occasionally, but very rarely, absent; anal segment with an elongate acute sting often exserted.

♂. Head transverse, compressed, sometimes orbicular or subtriangular; eyes generally more or less emarginate on the inside, in some species ovate or round; ocelli three, placed in a triangle on the vertex; mandibles arcuate, generally tridentate at apex; thorax short, massive; tegulæ usually large, sometimes remarkably so. Wings broad and ample, the fore wing with three, in some species only two, cubital cells; the 2nd and 3rd each receive a recurrent nervure; when only two cubital cells are present, the 2nd recurrent nervure is obsolete. Legs long and pubescent. Abdomen ovate, generally strongly curved downwards towards apex, the apex armed with blunt teeth or spines; the 1st segment sometimes petiolate.

Key to the Species.

Females *.

- A. Head black; thorax red.
  - *a*. Second abdominal segment with two spots, the spots lateral.
    - *a'*. The spots of yellow or golden pubescence.
      - a^2. Apical margin of 2nd abdominal segment with a transverse fascia of yellow or golden pubescence.
        - a^3. First abdominal segment black, with a semilunar spot of yellow pubescence .... *M. maximinæ*, p. 10.
        - b^3. First abdominal segment entirely black.
          - a^4. Anal segment rufo-ferruginous.
            - a^5. Lateral spots on 2nd abdominal segment small; marginal fascia very narrow.......... *M. pulchrinella*, p. 10.
            - b^5. Lateral spots on 2nd abdominal segment large; marginal fascia broad................ *M. ninnii*, p. 11.
          - b^4. Anal segment black.
            - a^5. Transverse band on 2nd and 3rd segments broadly interrupted in the middle .... *M. feæ*, p. 11.
            - b^5. Transverse band on 2nd and 3rd segments entire .... *M. lilliputiana*, p. 11.
      - b^2. Apical margin of 2nd abdominal segment without a transverse fascia.
        - a^3. Fourth abdominal segment with a transverse fascia of yellow or golden pubescence.
          - a^4. Head with golden pubescence .. *M. pulchriceps*, p. 12.
          - b^4. Head without golden pubescence.
            - a^5. Thorax posteriorly armed with two teeth .... *M. tridungulata*, p. 11.
            - b^5. Thorax not so armed .... *M. soror*, p. 12.
        - b^3. Fourth abdominal segment without a transverse fascia .... *M. pectino-spinata*, [p. 12.

* In many species only one sex is known.

b′. The spots of white pubescence.
  a². Apical margin of 1st abdominal segment ciliated with yellow pubescence .... *M. niveosignata*, p. 13.
  b². Apical margin of 1st abdominal segment not ciliated with yellow pubescence; segment entirely black.
    a³. Third abdominal segment with an entire transverse pubescent white band on apical margin .... *M. dimidiata*, p. 13.
    b³. Third abdominal segment with a transverse pubescent white band on apical margin broadly interrupted in the middle.
      a⁴. Fourth abdominal segment without a distinct band or elongate spots on either side .... *M. vicinissima*, p. 13.
      b⁴. Fourth abdominal segment with a distinct medially interrupted band on its apical margin.
        a⁵. Length under 7 mm. .... *M. ruficrus*, p. 14.
        b⁵. Length over 10 mm.
          a⁶. Posterior margin of thorax truncate, the punctures on the truncation running into striæ .... *M. interrupta*, p. 14.
          b⁶. Posterior margin of thorax truncate, the punctures on the truncation not running into striæ .... *M. subintrans*, p. 15.
    c³. Third abdominal segment with a lateral more or less circular or oblong spot.
      a⁴. The lateral spot at base of the segment .... *M. colabensis*, p. 15.
      b⁴. The lateral spot in the middle on either side or past the middle, close to the margin of the segment.
        a⁵. A lateral spot on the 4th segment.
          a⁶. Legs red .... *M. ceylanensis*, p. 15.
          b⁶. Legs black.
            a⁷. Antennæ black .... *M. aulica*, p. 15.
            b⁷. Antennæ ferruginous .... *M. hexaops*, p. 16.
        b⁵. No spot on the 4th segment .... *M. valida*, p. 16.
    d³. Third segment entirely black, immaculate .... *M. wroughtoni*, p. 16.

b. Second abdominal segment with two spots, the spots medial, one above the other.
  a′. The spots golden .... *M. pulla*, p. 17.
  b′. The spots silvery white.
    a². Third abdominal segment with silvery pubescence.
      a³. Thorax rounded posteriorly.
        a⁴. Head black .... *M. blanda*, p. 17.
        b⁴. Head silvery .... *M. constanceæ*, p. 17.

b^3. Thorax transverse or truncate posteriorly.
  a^4. First abdominal segment with a transverse band of silvery pubescence at apex .... *M. pondicherensis*, p. 18.
  b^4. First abdominal segment without any transverse band.
    a^5. Apical margin of 2nd with a transverse silvery band in addition to the spots .... *M. rufitarsis*, p. 18.
    b^5. Apical margin of 2nd without a transverse band .... *M. aurga*, p. 18.
b^2. Third abdominal segment without any silvery pubescence .... *M. subglabra*, p. 19.
c. Second abdominal segment with a single spot of golden or silvery pubescence.
  a'. Spot golden yellow.
    a^2. First abdominal segment with a transverse band or fimbria of yellow pubescence on its apical margin.
      a^3. Ventral carina on 1st abdominal segment emarginate .... *M. conjungenda*, p. 19.
      b^3. Ventral carina on 1st abdominal segment dentate................ *M. kirbyii*, p. 20.
    b^2. First abdominal segment without a transverse band or fimbria of yellow pubescence on its apical margin.
      a^3. Second abdominal segment with a transverse band of yellow pubescence on its apical margin in addition to the spot .... *M. tenasserimica*, p. 20.
      b^3. Second abdominal segment without a transverse band of yellow pubescence on its apex.......... *M. buddha*, p. 21.
  b'. Spot silvery white.
    a^2. First abdominal segment ciliated with white hairs...................... *M. coronata*, p. 21.
    b^2. First abdominal segment not ciliated with white hairs.
      a^3. Second abdominal segment with a transverse band of white pubescence on its apical margin, in addition to the spot .... *M. decora*, p. 21.
      b^3. Second abdominal segment with no transverse pubescent band .. *M. trimaculata*, p. 22.
d. Second abdominal segment with three spots of golden or silvery pubescence.
  a'. One spot at base, two on the margin.
    a^2. Vertex of head with a spot of white pubescence .... *M. argenteomaculata*, [p. 22.
    b^2. Vertex without any such spot ... .. *M. kohli*, p. 23.
  b'. All three spots on the margin .... *M. cotesi*, p. 23.
  c'. All three spots near base .... *M. nobilis*, p. 24.
e. Second abdominal segment immaculate.
  a'. First abdominal segment with one spot near base, and a transverse band of yellow pubescence on its apical margin. *M. laminella*, p. 24.

b'. First abdominal segment without spot or band .... *M. cassiope*, p. 24.
c'. First abdominal segment with 4 spots .. *M. sex-maculata*, p. 25.
f. Second abdominal segment with a transverse fascia on its apical margin.
a'. The fascia of golden or fulvous pubescence.
a^2. Apex of the thorax truncate........ *M. agnata*, p. 25.
b^2. Apex of the thorax bluntly rounded *M. insularis*, p. 25.
c^2. Apex of the thorax angular .... *M. serratula*, p. 26.
b'. The fascia of white pubescence .... *M. dissimulanda*, p. 26.

B. Head black variegated with red or ferruginous; thorax red.
a. Second abdominal segment with three pubescent white spots .... *M. rothneyi*, p. 27.
b. Second abdominal segment with four pubescent white spots or marks.
a'. Three of the spots in a triangle above, the 4th medially on the apical margin. *M. pandora*, p. 27.
b'. One spot on each side near base, two on the apical margin.
a^2. Posterior lateral angles of the thorax produced backwards............ *M. kanthellæ*, p. 28.
b^2. Posterior lateral angles of the thorax rounded .... *M. maculiceps*, p. 28.
c. Second abdominal segment with two pubescent white spots or marks, one at base round, the other on apical margin semicircular .... *M. nigrigena*, p. 28.
d. Second abdominal segment with no spots, but a fascia on its apical margin of white pubescence........................ .. *M. reticulata*, p. 29.
e. Second abdominal segment with one spot of white pubescence.
a'. Third abdominal segment with a spot of white pubescence .... *M. ocellata*, p. 29.
b'. Third abdominal segment with a broad fascia of silvery pubescence .... *M. maculo-fasciata*, [p. 29.

C. Head and thorax both black.
a. Second abdominal segment black, with a medial spot of golden pubescence ...... *M. variegata*, p. 30.
b. Second abdominal segment black, with a lunate mark of silvery pubescence ...... *M. funeraria*, p. 30.
c. Second abdominal segment black, with a medial round spot near base, and a broad transverse band of yellowish-white pubescence .... *M. arenaria*, p. 30.
d. Second abdominal segment not spotted, but otherwise coloured.
a'. Abdominal segments 1–5 covered with golden pubescence; 6th segment black. *M. semiaurata*, p. 31.
b'. First and second segments and basal margin of third with transverse bands of golden pubescence .... *M. remota*, p. 31.

D. Head and thorax red.

- *a*. Second abdominal segment with a spot of golden pubescence on each side.
  - *a'*. With a transverse band of pubescence on its apical margin also.
    - a^2. The band golden yellow in colour .. *M. cicatrificera*, p. 31.
    - b^2. The band yellowish white .... *M. aurifrons*, p. 32.
  - *b'*. Without a transverse band of pubescence on its apical margin.
    - a^2. Third abdominal segment with a spot on each side.
      - a^3. The spots of golden pubescence .. *M. diversa*, p. 32.
      - b^3. The spots of silvery pubescence .. *M. dives*, p. 32.
    - b^2. Third abdominal segment with a single medial spot .... *M. chrysophthalma*, [p. 33.
    - c^2. Third abdominal segment with a transverse band of golden pubescence, or covered wholly with it.
      - a^3. Pygidium striate .... *M. nudiceps*, p. 33.
      - b^3. Pygidium punctate .... *M. erythrocera*, p. 33.
- *b*. Second abdominal segment with two medial silvery spots, one above the other ...... *M. regia*, p. 34.
- *c*. Second abdominal segment with a silvery white spot on each side .... *M. æstuans*, p. 34.
- *d*. Second abdominal segment without spots, but with a transverse band of golden or silvery pubescence.
  - *a'*. Band of golden pubescence.
    - a^2. At base only .... *M. aurifex*, p. 34.
    - b^2. At both base and apex .... *M. humbertiana*, p. 35.
    - c^2. At apex only.
      - a^3. Thorax with a conical projection or tooth on each side.
        - a^4. Abdomen petiolate.
          - a^5. First abdominal segment with a transverse fascia at apex .. *M. placida*, p. 35.
          - b^5. First abdominal segment without a transverse fascia at apex. *M. aureorubra*, p. 35.
        - b^4. Abdomen not petiolate .... *M. trichocondyla*, p. 36.
      - b^3. Thorax with no lateral conical projection or tooth.
        - a^4. Thorax anteriorly transverse .... *M. bicincta*, p. 36.
        - b^4. Thorax anteriorly arched, subangular .... *M. kauaræ*, p. 36.
  - *b'*. Band of silvery pubescence.
    - a^2. Third and following abdominal segments also with transverse bands of silvery pubescence .... *M. atomus*, p. 37.
    - b^2. Third and following abdominal segments black, without bands of silvery pubescence.
      - a^3. Basal abdominal segment broadly brown in the middle .... *M. denticollis*, p. 37.
      - b^3. Basal abdominal segment not broadly brown in the middle—black .... *M. coroman elica*, p. 37.

e. Second abdominal segment with a single spot of golden yellow or white pubescence.

a'. Spot of golden pubescence.

a^2. The first abdominal segment black, immaculate.

a^3. Thorax with a lateral conical projection or tooth .... *M. veda*, p. 37.

b^3. Thorax without a lateral conical projection or tooth .... *M. pusilla*, p. 38.

b^2. First abdominal segment maculate.

a^3. Thorax dentate posteriorly, with a medial spine.................. *M. lunarifasciata*, [p. 38.

b^3. Thorax not dentate or spined posteriorly .... *M. puerilis*, p. 38.

b'. Spot of silvery pubescence.

a^2. Apical margin of 2nd abdominal segment with a transverse band also of white pubescence .... *M. poonaensis*, p. 39.

b^2. Apical margin of 2nd abdominal segment with a spot only of white pubescence .... *M. rufiventris*, p. 39.

f. Second abdominal segment with three or more spots of silvery or golden pubescence.

a'. The spots silvery.

a^2. Four spots.

a^3. Abdomen petiolate .... *M. auropalliata*, p. 39.

b^3. Abdomen not petiolate .... *M. optima*, p. 40.

b^2. Three spots.

a^3. Abdomen black .... *M. pulchriventris*, [p. 40.

b^3. Abdomen deep cærulean blue .... *M. metallica*, p. 41.

b'. The spots golden .... *M. perelegans*, p. 41.

g. Second abdominal segment black, immaculate .... *M. pulchrina*, p. 41.

E. Head brown; thorax red or brown, posteriorly red.

a. Thorax red . ... *M. taylori*, p. 42.

b. Thorax brown, changing to ferruginous red posteriorly .... *M. argentipes*, p. 42.

Males.

A. Thorax black.

a. Abdomen more or less red.

a'. Wings fuscous, paler at the base.

a^2. Basal abdominal segment only red .. *M. opulenta*, p. 42.

b^2. Second abdominal segment only red . *M. argenteomaculata*, [p. 22.

c^2. First, second, and third abdominal segments red.

a^3. Fourth abdominal segment with an ill-defined silvery transverse pubescent fascia .... *M. schlettereri*, p. 43.

b^3. Fourth abdominal segment with a well-defined golden transverse pubescent fascia .... *M. stephani*, p. 43.

d^2. First to the fourth abdominal segments red.

a^3. Length 11–13 mm. .... *M. analis*, p. 44.

b^3. Length 15–17 mm. .... *M. interrupta*, p. 14.

e^2. Second to the fifth abdominal segments red.
  a^3. Front between the antennæ with a short spinous process .... *M. subanalis*, p. 41.
  b^3. Front between the antennæ without a spine .... *M. tornatorei*, p. 45.
f^2. First to the fifth abdominal segments red........................... *M. pillosella*, p. 45.
b'. Wings dark fuscous, with a purple effulgence.
  a^2. Basal two abdominal segments red .. *M. unifasciata*, p. 45.
  b^2. Base and apical margin of 1st and base of 2nd abdominal segment red. *M. josephi*, p. 45.
  c^2. Basal three abdominal segments red.
    a^3. Length 11–12 mm................ *M. gribodoi*, p. 46.
    b^3. Length 5 mm.................... *M. handlirschi*, p. 46.
  d^2. Second to fifth abdominal segments red.
    a^3. Scutellum raised, produced at back into a sharp conical tubercle.
      a^4. Length 12 mm. .... *M. emergenda*, p. 47.
      b^4. Length over 18 mm.
        a^5. Head and thorax with silvery pubescence .... *M. dimidiata*, p. 13.
        b^5. Head and thorax with black pubescence .... *M. indostana*, p. 47.
    b^3. Scutellum not tuberculate .... *M. emeryi*, p. 47.
b. Abdomen entirely black.
  a'. Head sloping backwards, longitudinally striate.
    a^2. Basal four abdominal segments with transverse bands of white pubescence. *M. exiloides*, p. 48.
    b^2. Basal three abdominal segments with transverse bands of white pubescence. *M. circumscribenda*, [p. 48
  b'. Head rounded, not sloping backwards, punctured .... *M. discreta*, p. 48.

B. Thorax red; abdomen chiefly or wholly black.
a. Head black.
  a'. A transverse band on margin of 2nd and the whole of the 3rd abdominal segment with white or yellow pubescence.
    a^2. The pubescence white.............. *M. cariana*, p. 49.
    b^2. The pubescence yellow .... *M. conjungenda*, p. 19.
  b'. Apical margins of basal three segments with bands of white pubescence .... *M. antennata*, p. 49.
  c'. Apical margins of basal three segments black........................... *M. dilecta*, p. 49.
b. Head red.
  a'. Basal abdominal segments red, remaining segments black.................. *M. pedunculata*, p. 51.
  b'. Abdomen black, with white pubescent spots .... *M. rothneyi*, p. 27.
  c'. Abdomen entirely black .... *M. perversa*, p. 50.
  d'. Abdomen with 3rd and 4th segments covered with golden pubescence.
    a^2. Scutellum with a tooth on each side posteriorly .... *M. aurifex*, p. 34.
    b^2. Scutellum not dentate.............. *M. perelegans*, p. 41.

C. Thorax partly black, partly red.
  a. Thorax anteriorly red, posteriorly black.
    a'. Basal abdominal segment not petiolate.
      a^2. Abdomen with white pubescence.
        a^3. *Third and fourth segments with a spot of white pubescence on either side* .... *M. miranda*, p. 50.
        b^3. Third and fourth segments without any such spots, plain black...... *M. provida*, p. 50.
      b^2. Abdomen with golden pubescence .. *M. nobilis*, p. 24.
    b'. Basal abdominal segment much narrowed and petiolate...................... *M. sejugoides*, p. 50.
  b. Thorax anteriorly black, posteriorly red .. *M. rufodorsata*, p. 51.
D. Thorax metallic blue .... *M. yerburyi*, p. 51.

2. **Mutilla maximinæ**, *Magr. Ann. Mus. Civ. Gen.* (2^a) xii, 1892, p. 218, ♀.

♀. *Head in front and the vertex coarsely and deeply punctured;* thorax narrow, subquadrangular, lightly convex, slightly constricted in the middle on the disc, densely and minutely longitudinally striate, very slightly reticulate, the margins undulate, in some places slightly toothed, the lateral angles above somewhat dentate; the plate of the scutellum absent; pleuræ smooth and shining; the carina on the basal ventral segment absent; the 2nd segment of the abdomen above densely pubescent, the base of the anal segment rugosely punctate. Black, the thorax, the coxæ, and basal half of the femora rufo-ferruginous; an oval semilunar spot of yellowish pile on the posterior margin of the 1st abdominal segment, two small spots of the same near the anterior margin of the 2nd segment, and a broadly-arched fascia on its posterior margin; short linear yellowish maculæ also on the posterior margins of the 3rd, 4th, and 5th segments; the anal segment with long sparse grey, and the 2nd segment above with dense black pubescence.

Hab. Karen Hills, Burma. ♀. *Length* 8 mm.

3. **Mutilla pulchrinella**, *Magr. Ann. Mus. Civ. Gen.* (2^a) xii, 1892, p. 212, ♀.

♀. Head nearly as wide as the thorax, in front rugose, above longitudinally punctate; thorax in front and in the middle coarsely rugose, posteriorly punctured, the punctures running into wide reticulations; the plate of the scutellum short, broad, slightly elevated; the lateral margins of the thorax nearly entire, barely sinuate; the 1st abdominal segment shining, sparsely punctured, no carina on its ventral side, the 2nd segment broadly smooth and shining at base, above lightly punctured with sparse pubescence; the whole head, thorax, and abdomen covered sparingly with long grey pubescence. Black, the thorax, the legs (the tibiæ and tarsi excepted), the mandibles except at their apex, the scape of the antennæ, and the anal segment of the abdomen rufo-ferruginous; two small, round, widely separated spots on the 2nd

segment of the abdomen, a narrow band on its apical margin, and a wider one on the apical margin of the 3rd segment, of golden-yellow pile.

Hab. Karen Hills, Burma. ♀. *Length* 5 mm.

4. **Mutilla ninnii,** *Magr. Ann. Mus. Civ. Gen.* (2a) xii, 1892, p. 211, ♀.

♀. Head with coarse longitudinal deep striæ; thorax rectangular, the sides excavated, the dorsum convex, the whole densely and minutely reticulate; the scutellum without a lamina; the posterior margin of the thorax slightly emarginate, and with slightly prominent papillæ; the 1st segment of the abdomen obsoletely longitudinally carinate; head and legs with a sparse silvery pubescence. Black, the thorax, the scape of the antennæ, and the anal segment rufo-ferruginous; the 2nd abdominal segment with two oval distinct maculæ above, its posterior margin with a broad fascia, the 3rd and anal segments with yellowish silky pile; the antennæ and the legs, more especially of the latter, the femora, and tarsi rufo-ferruginous.

Hab. Karen Hills, Burma. ♀. *Length* 6 mm.

5. **Mutilla feæ,** *Magr. Ann. Mus. Civ. Gen.* (2a) xii, 1892, p. 210, ♀.

♀. Closely allied to *M. dimidiata*, Fabr., but distinguished by the more minute sculpturing of the thorax, by the 1st ventral segment of the abdomen being distinctly carinated, and by the position of the spots of yellow pile on the 2nd, and of the fasciæ on the apical margins of the 2nd and 3rd abdominal segments; of these fasciæ the 1st is narrow and widely interrupted in the middle, and the 2nd is broad and less widely interrupted.

Hab. Bhamo, Upper Burma. ♀. *Length* 11 mm.

6. **Mutilla lilliputiana,** *André, Jour. Bomb. N. H. Soc.* viii, 1893, pp. 465, 476, ♀.

♀. Closely resembling *M. agnata*, André, but very much smaller: head minutely punctured; thorax short, very broad, nearly square, slightly wider in front than posteriorly, a narrow transverse collar between it and the head. Head and abdomen black, thorax red, scape and basal two joints of the flagellum of the antennæ and the legs testaceous red; two large contiguous spots on the vertex of the head, two others near the base of the 2nd abdominal segment, the posterior margin of the latter broadly, and the 3rd segment above covered with golden ferruginous pubescence, the rest of the abdomen with black pubescence.

Hab. Colaba, Bombay. ♀. *Length* 3 mm.

7. **Mutilla tridungulata,** *Magr. Ann. Mus. Civ. Gen.* (2a) xii, 1892, p. 269, 5, ♀.

♀. Head wider than the thorax, coarsely longitudinally rugose; thorax elongate, constricted in the middle, posteriorly emarginate and armed with two stout teeth; the plate of the scutellum short

and of the usual width, with two other laminæ placed triangularly above and somewhat prominent; the posterior portion of the thorax with longitudinal rugose folds furnished with prominent papillæ placed in lines; the 1st abdominal segment above with coarse oval punctures, beneath with a carina emarginate in the middle and bent downwards. Black, the thorax, the mandibles in the middle, and the apex of the abdomen rufo-ferruginous; the 2nd abdominal segment above with two oval yellowish spots of silky pile, the 3rd and 4th segments with a fascia of the same coloured pile, which in some varieties is interrupted medially. The anal segment has on both sides long, and the legs short and sparse, yellowish pile.

Hab. Palon, Burma; Karen Hills at low elevations. ♀. *Length* 9 mm.

8. **Mutilla soror,** *Sauss. Ann. Soc. Ent. Fr.* 1867, p. 354, pl. 8, fig. 3; *Rad. & Sich. Hor. Soc. Ent. Ross.* vi, 1869, p. 306.

♀. Head punctured, thorax more coarsely punctured and reticulate, abdomen densely pubescent; thorax from above square. Head and abdomen black, thorax red, the antennæ and legs black, the scape of the former and the coxæ of the legs reddish, the pubescence on the legs golden, on the abdomen black, with two large maculæ on the 2nd segment, the 3rd and 4th segments above clothed with golden pubescence.

Hab. Ceylon. ♀. *Length* 8 mm.

9. **Mutilla pulchriceps,** *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, pp. 121, 130, pl. iv, fig. 17.

♀. Closely allied to and resembling *M. soror*, Sauss.; differs in having the head covered densely with golden pile, and the sides of the thorax being irregularly concave, not straight.

Hab. Poona (*Wroughton*). ♀. *Length* 8 mm.

10. **Mutilla pectino-spinata,** *Magr. Ann. Mus. Civ. Gen.* (2[a]) xii, 1892, p. 212, ♀.

♀. The scape of the antennæ strongly curved, nearly half the length of the flagellum; head coarsely longitudinally channelled; thorax narrow, subrectangular, scarcely constricted in the middle, the sides irregularly emarginate, and spinose, posteriorly abruptly truncate, the upper margin with ten spinose papillæ, two long ones in the middle subarcuate, and four smaller ones on each side; the dorsal portion of the thorax longitudinally reticulate, the pleuræ smooth and shining, the posterior face of the metanotum coarsely reticulate towards the apex, with minute black striæ and ovate spots; the 2nd abdominal segment with black pubescence, densely rugosely punctate; the 1st ventral segment with a linear carina very prominent. Black, with greyish-yellow pubescence; the thorax, the intermediate femora, and the anal segment of the abdomen rufo-ferruginous; the 2nd abdominal segment with two

large oval maculæ, the 3rd and 5th segments with obsolete (probably due to attrition) fasciæ of greyish-yellow pile.

Hab. Rangoon, Burma. ♀. *Length* 13 mm.

11. **Mutilla niveosignata,** *André, Jour. Bomb. N. H. Soc.* viii, 1893, pp. 465, 480, ♀.

♀. Head, thorax, and abdomen coarsely and closely punctured and studded with erect hairs; head orbicular, strongly convex in front; thorax from above rectangular, truncate in front and posteriorly, the sides crenulate along the upper margin, smooth below, with the metapleuræ coarsely punctured, the truncation at apex smooth. Black, the pubescence black, the thorax above red, a narrow margin anteriorly black; abdomen with dense black pubescence, the basal segment nearly bare, ciliated on its posterior margin with yellow hairs, 2nd and 3rd segments with two oval spots covered with snow-white pubescence.

Hab. Poona; Orissa. ♀. *Length* 10 mm.

12. **Mutilla dimidiata,** *Lepel. Hym.* iii, p. 628, ♂; *Rad. & Sich. Hor. Soc. Ent. Ross.* vi, 1869, p. 285, ♂.

♀. Head about as wide as the thorax, striate in front, the striæ running into fine reticulations; thorax punctured, coarsely so posteriorly; from above rectangular, the sides slightly emarginate; the abdomen pubescent, the base of the 4th, 5th, and 6th segments finely punctured. Black, the thorax red, the femora of the legs beneath rufescent; abdomen with a round pubescent spot on each side at base of the 2nd segment, a broad medially interrupted fascia on the 3rd, a squarish spot on each side of the 4th, and a fringe on each side of the 6th, of silvery hairs.

♂. Head, thorax, and abdomen densely pubescent, punctured coarsely on the thorax, on the head the punctures are finer, and on the abdomen more sparsely scattered; the mesonotum with four longitudinal carinæ; median segment reticulate under the pubescence, somewhat truncate posteriorly, with a medial irregularly **V**-shaped carina and a short outwardly divergent carina on either side at base. Black, the pubescence silvery white on the head and thorax, red on the red portions of the abdomen; the abdomen red, with the basal and apical segments black; wings dark fuscous, with a purple effulgence.

Hab. Bengal; North-West Provinces; Bombay; Madras; Burma; Tenasserim; Ceylon; extending to the east as far as Luzon and Timor. ♀. *Length* 12–15 mm. ♂. *Length* 18–20; *exp.* 38–43.

13. **Mutilla vicinissima,** *Gribodo, Ann. Mus. Civ. Gen.* (2ª) i, 1884, p. 364, 28, ♀.

♀. Head, thorax, and abdomen punctured, the punctures very coarse and deep on the head and thorax, more shallow on the abdomen, on the thorax in certain lights they seem to run into

reticulations; head orbicular, slightly wider than the thorax, the eyes subspheroidal, small; thorax from above broadly rectangular, the anterior and posterior margins rounded; the apex steeply sloped. Head and abdomen black; thorax dark red; the apical joint of the flagellum of the antennæ testaceous; the whole head, thorax, and abdomen covered with short erect black hairs, the abdomen also with recumbent stiff black pubescence: a round spot on each side of the 2nd segment above, a broad elongate spot on each side on the apical margin of the 3rd, with some indistinct smaller markings on the sides of the other segments covered with white pubescence.

Hab. Minhla, Upper Burma. ♀. *Length* 9 mm.

14. **Mutilla ruficrus,** *Rad. MS., Magr. Ann. Mus. Civ. Gen.* (2[a]) xii, 1892, p. 205.

♀. Very closely resembling *M. subintrans*, Rad.; differs in being smaller, the head and thorax being more lightly punctured, the abdomen less pubescent, and the ventral carina on it less distinct.

Hab. Bhamo, Upper Burma; Karen Hills. ♀. *Length* 5–7 mm.

15. **Mutilla interrupta,** *Oliv. Encycl. Méth.* viii, p. 62.
Mutilla repræsentans, *Smith, Cat.* iii, p. 35, ♀.

♀. Head not so wide as the thorax, closely and not very coarsely punctured, the scape of the antennæ and the clypeus pubescent, eyes ovate; thorax rectangular, coarsely punctured, the sides excavate and smooth, posteriorly vertically truncate, the punctures on the posterior face running into vertical striæ; abdomen pubescent above, beneath smooth with the margins of the segments finely punctured. Black, the base and apex of the antennæ, the base of the mandibles, and the thorax red; legs and abdomen beneath rufo-fuscous; two round spots on the 2nd abdominal segment above, and lateral oblong spots on the 3rd and 4th segments covered with silky silvery pile, the apical segment fringed laterally with silvery hairs.

♂. Head and thorax coarsely punctured and sparsely pubescent, the clypeus and cheeks more densely so; mesonotum with three parallel longitudinal carinæ; the median segment long, narrowed posteriorly and coarsely reticulate, from the base three central parallel longitudinal carinæ run to half the length of the segment, the two outer ones meeting in a rounded loop beyond the apex of the central carina; abdomen smooth and shining, subpetiolate. Black, the pubescence on the head and thorax silvery, the basal four segments of the abdomen red; wings clear hyaline at base, light fuscous, with a purplish effulgence beyond the basal nervure of the fore wing and beyond the anal cell in the hind wing.

Hab. North-West Provinces; Bengal; Madras; Burma; Tenasserim, extending to China. ♀. *Length* 10–11 mm. ♂. *Length* 15–17; *exp.* 28–33 mm.

16. **Mutilla subintrans**, *Rad. & Sich. Hor. Soc. Ent. Ross.* vi, 1869, p. 228, ♀; *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 203.

♀. Closely allied to and resembling *M. interrupta*, Oliv., but of stouter build and more coarsely punctured on the thorax; head wider than the thorax, collar transversely striate; thorax from above rectangular, the sides emarginate, vertically truncate posteriorly, punctured, the punctures not running into striæ; abdomen pubescent above, beneath the basal segment with a prominent longitudinal carina, the apical margins of the segments coarsely punctured. Coloration precisely similar to that of *M. interrupta*.

Hab. Ceylon; Burma; Tenasserim. ♀. *Length* 12 mm.

17. **Mutilla colabensis**, *André, Jour. Bomb. N. H. Soc.* viii, 1893, pp. 466, 475, ♀.

♀. Head and thorax somewhat coarsely punctured and covered with erect hairs; abdomen densely pubescent; head from above slightly rectangular, not strongly convex in front, broader than the thorax, the latter from above rectangular, the sides parallel, the angles somewhat rounded. Head and abdomen black; the thorax above red, below and the sides with a narrow margin all round above black; the pubescence on the abdomen jet-black; a round spot on the front of the head, an oval spot on each side close to the base of the 2nd, and another on each side close to the base of the 3rd abdominal segment, covered with snow-white pubescence.

Hab. Colaba, Bombay. ♀. *Length* 6 mm.

18. **Mutilla ceylanensis**, *Rad. & Sich. Hor. Soc. Ent. Ross.* vi, 1869, p. 247, ♀.

♀. Head coarsely punctured, thorax striate-punctate, abdomen pubescent; eyes large, round; thorax squarish with the angles rounded; abdomen subsessile. Head and abdomen black; thorax red; abdomen with black pubescence, two round spots in the middle of the 2nd, 3rd, and 4th segments of white pubescence, the sides of the segments and the apical segment ciliated with white hairs; legs red, with scattered white hairs.

Hab. Ceylon. ♀. *Length* 9 mm.

Unknown to me, but from the description I should say very close to *M. sexmaculata*, Swed., if not identical with it.

19. **Mutilla aulica** *, *Smith, Cat.* iii, p. 37, ♀.

♀. Head and thorax closely and coarsely, abdomen finely

* The following species described by Olivier (Encycl. Méth. viii, p. 61, ♀) from "Les Indes Orientales" has not, so far as I know, been procured of late years by any collector:—

"*M. rugosa*. ♀. Hirta, nigra; thorace postice, abdominis primo segmento secundoque basi, rufo-aureo-pilosis, secundi apice, tertio, quarto, quintoque nigris, albo-tripunctatis."—Rad. & Sich. Hor. Soc. Ent. Ross. vi, 1869, p. 259. Radozkovsky and Sichel also regard *M. bengalensis*, Lepel., as probably a variety of the above.

punctured and pubescent; the pubescence short, thick, velvety, with a mixture of long black hairs; thorax above slightly convex, rectangular, the sides excavated, smooth; the median segment posteriorly truncate; the pronotum anteriorly rounded, narrowed into a collar towards the head. Black, the thorax above obscurely dark red, a circular spot on the vertex of the head, an oblong patch on the sides of the thorax, and a sublateral spot on each side of the 2nd, 3rd, and 4th segments of the abdomen, of white pubescence.

Var. The spot on the vertex obsolete or absent; thorax sometimes black.

Hab. Northern India; Ceylon. ♀. *Length* 6–8 mm. Type in British Museum.

20. **Mutilla hexaops**, *Sauss. Ann. Soc. Ent. Fr.* 1867, p. 356, pl. 8, fig. 6.

♀. Closely allied to and resembling *M. sexmaculata*, Swed., but constantly smaller; the antennæ ferruginous; the thorax red not black, the 2nd, 3rd, and 4th segments with a round spot on each side covered with white pubescence.

Hab. Ceylon. ♀. *Length* 7 mm.

21. **Mutilla valida**, *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♀. Head, thorax, and abdomen evenly, rather closely and coarsely punctured, densely pubescent; thorax suboval, the lateral margins lightly crenulate, the sides slightly excavated, smooth, with two fine oblique carinæ; median segment posteriorly slightly but distinctly emarginate. Black, the mesonotum, scutellum, postscutellum, and median segment above red, this colour extending halfway down the posterior face, but not on the sides of the median segment; pubescence fuscous, with some white hairs on the legs and pectus; a spot behind the eyes, a patch on the mesopleuræ, and large circular sublateral spots on the 2nd and 3rd segments of the abdomen, white; the middle of the apical margins of segments 1–3 above with fusco-fulvous pubescence.

Hab. Barrackpore, Bengal. ♀. *Length* 7 mm. Type in coll. Rothney.

*22. **Mutilla wroughtoni**, *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, pp. 123, 127, pl. iv, fig. 15, ♀.

"Black, the thorax above rufous, the base of the 2nd abdominal segment with two oval white marks. Antennæ stout; the 3rd joint about one-half longer than the 4th. Head broader than the thorax, coarsely rugosely punctured; eyes moderate, oblong, the head well developed behind them. Thorax more coarsely rugose than the head, the pleuræ apparently impunctate; the sides of the thorax above rough, becoming gradually dilated to the apex; the apex of the median segment oblique, black. Abdomen shorter than the head and thorax united, the subsessile pygidium apparently punctured, covered with long hairs. The upper surface

of the insect has the hair black; the ventral longer and whitish. Legs covered with white hairs.

"*Length* 8½ mm."

Hab. Poona (*Wroughton*).

23. **Mutilla pulla**, *André, Jour. Bomb. N. H. Soc.* viii, 1893, pp. 464, 473, ♀.

♀. Head, thorax, and abdomen very finely and closely punctured, on the front running into longitudinal striæ; head wider than the thorax; thorax rounded in front and at apex, and rounded convexly from front to apex; the antennæ long and proportionately very thick. Head and abdomen black, the scape and basal joint of the flagellum of the antennæ, the thorax, and legs red; an oval medial spot near the base, and a broad lunate one, on the apical margin of the 2nd abdominal segment, covered with pale golden pubescence.

Hab. Canara, Bombay Presidency. ♀. *Length* 5 mm.

24. **Mutilla blanda**, *Smith, Cat.* iii, p. 32, ♀.

♀. Head and thorax closely and coarsely, and the abdomen finely punctured and pubescent: thorax from above nearly oval, anteriorly and posteriorly broadly rounded; the sides excavated and smooth, the lateral margins above crenulate; abdomen broad, short, about as long as the head and thorax together, the apical segment finely longitudinally striate on the sides. Black, the thorax above and on the sides red, the pubescence white, thin, and scattered; two median spots, one at the base and one on the posterior margin of the 2nd segment, and the whole of the 3rd segment above, covered with glittering silvery pubescence.

Hab. India; Ceylon. ♀. *Length* 7 mm. Type in the British Museum.

*25. **Mutilla constanceæ**, *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, pp. 118, 134, pl. i, fig. 10, ♀.

"♀. Black, the thorax pale ferruginous above, an irregular mark on the base and apex of the second segment and the third segment white. Antennæ with the third joint about one quarter longer than the fourth; the first at apex, the second and the terminal beneath more or less piceous. Head not much wider than the thorax, coarsely punctured, densely covered with silvery hair; the antennal tubercles piceous, aciculate. Eyes oval, moderate, reaching quite close to the top of the head. Thorax quadrate, rounded at base and apex, the sides rough, slightly concave; above coarsely longitudinally punctured; the pleuræ impunctate, densely covered with white hairs. Abdomen as long as the head and thorax united, subsessile, dilated at the base of second segment, becoming gradually narrowed to the apex, coarsely punctured, in

the middle bearing rufous hairs, the sides with silvery hair; pygidium rufous, longitudinally striate, the ventral segments fringed with long silvery hairs. Legs covered with long silvery hairs; the tibial spines testaceous; the spurs white."

Hab. Poona. ♀. *Length* a little over 6 mm.

26. **Mutilla pondicherensis**, *Rad. & Sich. Hor. Soc. Ent. Ross.* vi, 1869, p. 204, ♀.

♀. Head and thorax punctured, rugose; abdomen pubescent; the head moderately wide, covered with scattered pubescence; antennæ slightly thickened in the middle; thorax from above squarish, rugose, truncate posteriorly; the truncation rugulose, the sides covered with a decumbent pubescence; 1st segment of the abdomen carinated; the pygidium flat and longitudinally striate. Black, the thorax red, the pubescence on the head and thorax silvery, on the abdomen black; the apical margin of the 1st, two medial spots, one above the other, on the 2nd segment, and the 3rd segment above covered with silvery pubescence; legs black with scattered silvery hairs.

Hab. Pondichery. ♀. *Length* 11 mm.

27. **Mutilla rufitarsis**, *Smith, New Sp. Hym. B. M.* p. 199.
? Mutilla taprobanæ, *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 125.

♀. Head and thorax finely, regularly, and very closely punctured; abdomen densely pubescent; head orbicular, narrower than the thorax; thorax rectangular, broad, anteriorly and posteriorly roundly truncate; abdomen short, wide, broadly oval, punctured under the pubescence; the pygidium finely longitudinally striate. Head, legs, and abdomen black, with black pubescence; thorax red; a large round spot in the middle of the 2nd abdominal segment close to the base, another smaller on the middle of the apical margin, with the narrow apical margin itself, and the whole of the 3rd segment above covered with silvery white pubescence.

Hab. India (*Smith*). ♀. *Length* 11 mm.

From the description it seems to me that *M. taprobanæ*, Cam., is only a variety of this species.

28. **Mutilla durga**.
Mutilla dives, *Cam.* (*nec Smith, Cat.* v, p. 32) *Mem. Manch. L. Ph. Soc.* xli (1897).

♀. Head and thorax coarsely, and abdomen finely and closely punctured; head small, not so wide as the thorax; eyes large, oval; thorax from above nearly rectangular, anteriorly and posteriorly almost transverse, the sides deeply excavated, coarsely reticulate; abdomen densely pubescent. Black, the thorax in the middle red, leaving a narrow black margin all round; a circular median spot at the base of the 2nd abdominal segment, another close to the apical margin, and the entire 3rd segment above

covered with silvery white pubescence, the sides and ventral segments fringed with white hairs.

Hab. Barrackpore, Bengal. ♀. *Length* 8 mm. Type in coll. Rothney.

29. **Mutilla subglabra**, *André, Jour. Bomb. N. H. Soc.* viii, 1893, pp. 464, 472, ♀.

♀. Head, thorax, and basal two abdominal segments minutely and closely punctured, and covered with short erect hairs; head orbicular; antennæ long and massive, but less so than in *M. pulla*; thorax from above narrowly rectangular, the front and apex steeper, and not so rounded as in *M. pulla*. Head and abdomen black; thorax red; antennæ black, with the scape and basal joint of the flagellum red; legs brown, tarsi testaceous; a medial oval spot near the base, and a large round spot at the apex of the 2nd abdominal segment covered with silvery pubescence.

Hab. Canara, Bombay Presidency. ♀. *Length* 4 mm.

30. **Mutilla conjungenda**, *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 214, ♀ ♂.

♀. Head coarsely and deeply punctured and rugose, about the width of the thorax; thorax short, posteriorly rounded, anteriorly and in the middle minutely reticulate, posteriorly more coarsely reticulate with the papillæ distinct; the plate of the scutellum small, scarcely projecting; the pleuræ smooth and opaque, pilose; the 1st abdominal segment above pilose, carrying beneath a distinct emarginate carina; the 2nd segment densely pubescent above, beneath shining and sparsely punctured. Black, the basal half of the mandibles, the base of the antennæ, and the thorax rufo-ferruginous; a fimbria of silky yellow pubescence on the posterior margins of the 1st and anal segments above and on the posterior margins of all the ventral segments, a spot on the middle above of the 2nd segment, a transverse band on its posterior margin, and the whole of the 3rd segment covered with the same pubescence; the transverse band on the margin of the 2nd segment is produced anteriorly into a triangular point in the middle; the 1st segment at base above covered with griseous, the 2nd with black pubescence.

♂. Head strongly punctured and rugose, slightly shining; eyes ovate, lightly emarginate, the ocellar area raised and bearing a carina down the middle; the mandibles flat, branched, strongly dilated, tridentate; pro- and mesonotum minutely punctured, metanotum with broad reticulations, the median portion obsoletely lanceolate; pro- and mesopleuræ punctured, metapleuræ smooth and shining; the 1st ventral segment carinated, the carina distinct, linear and lightly emarginate in the middle. Black, thorax rufo-ferruginous, the pectus black; wings light fuscous with a violet effulgence, the base hyaline; the tegulæ black; the 1st abdominal segment with a marginal fimbria, the

2nd with a transverse band on its apical margin, the 3rd and anal segments covered with yellow pubescence; the 1st and 2nd abdominal segments punctured above and below.

Hab. Upper Burma. ♀. *Length* 7 mm. ♂. *Length* 9; *exp.* 18 mm.

31. **Mutilla kirbyi,** *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 216, ♀.

♀. Head and anterior two-thirds of the thorax very coarsely rugose reticulate, posterior portion punctured, the punctures running into longitudinal papillose striæ; the plate of the scutellum wide, prominent, the lateral angles set with distinct papillæ; the pleuræ smooth, opaque; basal abdominal segment aciculately punctured above, beneath the ventral carina distinctly dentate; 2nd segment above densely pubescent, beneath somewhat coarsely and strongly punctured, the remaining segments above with long pubescence, beneath shining, minutely transversely striolate; the lateral angles and apical margins moderately punctured; anal segment above minutely longitudinally striate; the apex emarginate. Black, the thorax, the anterior and intermediate coxæ and femora almost entirely, and the basal abdominal segment widely rufo-ferruginous; the base and apex of the scape and the flagellum of the antennæ beneath nigro-ferruginous; abdomen with the apical margin of the 1st segment, a median pyriform oval spot, and narrow transverse band on the apical margin of the 2nd, the 3rd entirely, and the anal segment on both sides covered with golden fulvous pubescence; the pubescence short and dense on the 3rd, longer and less dense on the anal segment; the 2nd–5th ventral segments ciliated on their posterior margins with yellow hairs; the head and thorax above covered with black; the sternum, metathorax, basal abdominal segment, and legs with grey pile; the palpi and the spines of the tibiæ and tarsi testaceous yellow.

Var. The basal abdominal segment totally black.

Hab. Karen Hills, Burma. ♀. *Length* 12 mm.

32. **Mutilla tenasserimica,** *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 214, ♀.

♀. Head densely minutely punctured; thorax narrow, rectangular posteriorly, abruptly truncate, anteriorly and in the middle above minutely reticulate, posteriorly the reticulations are larger, the plate of the scutellum obsolete in certain cases, the papillæ scarcely prominent; the pleuræ shining; the 1st abdominal segment above smooth and shining, its posterior margin somewhat minutely punctured; the ventral carina obsolete or barely observable; the abdomen densely set with silvery, and the legs with black pubescence. Black, the thorax, base of the mandibles, and scape of the antennæ at base and apex ferruginous red; a large spot at the base of the 2nd abdominal segment, an arched transverse band on

its posterior margin, the 3rd segment entirely, and the posterior margin of the 4th segment covered with silky yellow pile.

Hab. Tenasserim (*Meetan*). ♀. *Length* 5 mm.

*33. **Mutilla buddha,** *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, pp. 117, 132.

"♀. Black, the thorax ferruginous; an oval spot on the base of second segment and the whole of the third pale golden-fulvous. Head narrower than thorax, very coarsely punctured, almost reticulated; eyes large, oval, antennal tubercles impunctate; vertex not much raised above the eyes, roundly convex; the clypeus fringed with long fulvous, the rest of the head sparsely with fuscous hairs; mandibles piceous in the middle. Scape covered with pale fulvous hairs; the flagellum with a pale down, brownish beneath; the third joint not much longer than the fourth, shorter than the fourth and fifth united. Thorax coarsely longitudinally reticulated; the pleuræ entirely impunctate, becoming gradually but not much narrowed from extreme base to apex; the edges rough, but without any distinct tubercles: apex of median segment obliquely sloped. Abdomen longer than the head and thorax united; the first segment dilated, the second segment longitudinally punctured; the others with their apices shining, impunctate, glabrous; the pygidium coarsely punctured; the extreme apex finely transversely striate; the apical ventral segments fringed with long fulvous hairs. Legs: the femora sparsely covered with longish blackish hairs, the tibiæ and tarsi thickly with pale fulvo-golden; the calcaria and the bristles on the underside of the tarsi rufous; the four tibial spines stout, black.

"*Hab.* Poona (*Wroughton*). ♀. *Length* 11 mm."

34. **Mutilla coronata,** *Fabr. Ent. Syst.* ii, p. 369; *Sauss. Novara Reise, Hym.* p. 106, ♀.

♀. Head, thorax, and 2nd abdominal segment coarsely punctured; thorax posteriorly rounded, sloped transversely, rugose and granular, armed above at base with a minute erect lamella; abdomen densely pubescent. Head and abdomen black; thorax red, with cinereous pubescence on the sides, fuscous above; the basal segment of the abdomen ciliated with whitish fulvous hairs, 2nd segment with a round spot close to the base covered with white pubescence, the margin of the segment sometimes ciliated with white hairs, 3rd segment with white pubescence beneath; antennæ and legs black, the scape of the former rufescent.

Hab. Europe; Ceylon (*Sauss.*). ♀. *Length* 10 mm.

35. **Mutilla decora,** *Smith, New Sp. Hym. B. M.* p. 200; *Magr. Ann. Mus. Civ. Gen.* (2^a^) xii, 1892, p. 213.

♀. Head and thorax sparsely, abdomen densely pubescent;

head finely and closely, thorax less finely punctured; eyes nearly round; thorax squarish in front, posteriorly rounded, with a steep slope; 1st ventral segment strongly longitudinally carinate. Black, the antennæ, legs, and base of the 1st abdominal segment rufescent; the thorax red; a round spot in the middle above on the 2nd abdominal segment, a transverse band, widest in the middle on its posterior margin, and the 3rd segment above covered with silvery white pubescence.

Hab. Penang; Bhamo, Upper Burma; Rangoon district, Lower Burma. ♀. *Length* 7–8 mm.

36. **Mutilla trimaculata,** *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, pp. 122, 126.

♀. Head, thorax, and abdomen finely and closely punctured and pubescent, the pubescence consisting of thin rather longish erect hairs; the thorax from above long, oval, with the ends anteriorly and posteriorly broad, widely rounded; beneath, the sides are excavated and smooth. Black, the thorax and legs dark red; the apex of the 1st, 2nd, and 4th segments of the abdomen above with a spot of glistening white pubescence.

Hab. Poona, Western India. ♀. *Length* 5 mm. Type in coll. Rothney.

37. **Mutilla argenteomaculata,** *Smith, New Sp. Hym. B. M.* p. 199, ♀ ♂.

Fig. 3. *Mutilla argenteo-maculata*, ♀. $\frac{1}{1}$.

♀. Head, thorax, and abdomen coarsely cribrate, with erect sparsely set hairs; head orbicular, not so wide as the thorax; thorax convex, elongate, oval, with the top and bottom of the oval truncate, transverse, and with an acute tubercle on each side at middle; 1st abdominal segment short, subpetiolate, and narrowed, much depressed beneath the level of the base of the 2nd segment, which is nearly vertical. Head and abdomen black, thorax above and 1st abdominal segment red, sides of the thorax rufo-fuscous, sometimes red; the pubescence black; the sides of the thorax with a little golden pubescence; legs black; a large round macula on the head, three medial spots down the abdomen above (one at the base and one at the apex of the 2nd segment, and one at the apex of the 5th segment), and a spot on each side close to the posterior margin of the 2nd segment covered with silvery white pubescence.

♂. Head, thorax, and abdomen black, the 2nd abdominal segment more or less ferruginous; the head, the median segment, and the basal abdominal segment with white pubescence; an ovate spot in the middle of the apical margin of the 2nd segment,

a lateral one on the 3rd, and a medial one on the 5th and 6th of snow-white pubescence; wings fuscous, subhyaline at base.

Hab. Bombay; Ahmedabad (*Miss A. Brook*). ♀. *Length* 12–16 mm. ♂. *Length* 15; *exp.* 29 mm.

38. **Mutilla kohli,** *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 217, ♀.

♀. Head as wide as the thorax, in front longitudinally punctured and rugose, on the vertex coarsely furrowed; thorax suboval, its lateral margins distinctly emarginate and toothed, the pronotum above minutely punctured, mesonotum coarsely and deeply longitudinally reticulate and rugose; plate of the scutellum absent, but in place of it a line of distinct papillæ on the middle above; metathorax roundly declivous, coarsely reticulate, furnished on the posterior lateral angles with two strong spines, their apices obtuse and sub-bifid, also other smaller acute spines in the middle above; abdomen, particularly at the base of the 1st and on the apical half of the 2nd and following segments, densely and the sides sparsely pubescent; the carina on the 1st ventral segment nearly or completely obsolete. Black, thorax fusco-ferruginous, a subrectangular oval macula of yellowish white pubescence on the posterior margin of the 1st abdominal segment, other narrow arched indistinct spots of the same in the middle at the base of the 2nd segment, with two large triangular patches on its apical margin; linear yellow pubescent spots also on the apical margins of the 3rd, 4th, and 5th segments, and the anal segment fringed on both sides with yellowish hairs; the femora and tibiæ sparsely, and the tarsi densely covered with greyish pubescence; the apical margins of the ventral abdominal segments pale and sparsely ciliated; the pubescence on the abdomen above black, and on the sides mixed with grey hairs.

Var. a. The scape and apex of the flagellum of the antennæ rufo-ferruginous.

Var. b. The anterior legs and posterior femora obscurely ferruginous.

Hab. Bhamo, Upper Burma. ♀. *Length* 7 mm.

39. **Mutilla cotesi,** *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♀. Closely resembles *M. rothneyi* (p. 27), but the head is more globular, the eyes smaller, circular, and less prominent, the sides of the thorax not studded with sharp spines, but only crenulate, and the median segment has no central spine posteriorly: in colour the present species differs in having the head black, with a central spot of white pubescence on the forehead, the sides of the thorax and legs dark red, and the pubescent white spots on the abdomen smaller.

Hab. Barrackpore, Bengal. ♀. *Length* 8 mm. Type in coll. Rothney.

40. **Mutilla nobilis,** *Smith, Cat.* iii, p. 33, ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 120.

♀. Head and thorax coarsely punctured; abdomen densely pubescent: head elongate, half as long again as broad; eyes very small, ovate; thorax from above somewhat irregularly rectangular, narrowed posteriorly, with an inconspicuous acute tubercle on each side before the middle: abdomen very massive, much longer than the head and thorax united. Head and thorax red; antennæ and legs rufo-fuscous, the tibiæ and tarsi with dense golden pubescence; abdomen black, with black pubescence, three large contiguous spots at the base of the 2nd segment, and the 3rd and 4th segments above clothed with bright golden pubescence, the middle spot on the 2nd segment slightly further back than the other two, the band on the 3rd and 4th narrowly interrupted in the middle.

♂. Similar, the scape and basal two joints of the flagellum of the antennæ, and the legs pale reddish yellow, the median segment black, steeply sloped, nearly vertical posteriorly; abdomen subpetiolate, the 1st segment and the apical margins of the 2nd, 3rd, and 4th broadly covered with golden pubescence; wings fuscous, subhyaline at base.

Hab. Madras, Shevaroy Hills. ♀. *Length* 16 mm. ♂. *Length* 15–20; *exp.* 30–33 mm.

41. **Mutilla laminella,** *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 215, ♀.

♀. Head minutely but deeply, thorax more coarsely punctured, the punctures oblong, posteriorly merging into wide reticulation, the apex of the thorax abruptly truncate; the plate of the scutellum narrow, but very prominent; the pleuræ shining; the ventral carina distinct, its margin roundly falcate. Black; the mandibles (except at apex), the base and apex of the scape of the antennæ, and the thorax rufo-ferruginous; the apical margins of the 2nd, 3rd, and anal abdominal segments and the tarsi variegated with rufo-testaceous; the whole head and thorax with sparse cinereous, and the abdomen with dense black pubescence; an obsolete spot on the 1st segment above, a fascia on its apical margin, and a subtriangular patch on the middle above of the 3rd segment, of silky yellow pile.

Hab. Mandalay, Upper Burma. ♀. *Length* 5 mm.

42. **Mutilla cassiope,** *Smith, Jour. Linn. Soc.* 1858, p. 86, ♀; *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 219.

♀. Head, thorax, and abdomen thinly pubescent; the head, thorax, basal two abdominal segments, the base of the 4th and 5th, and the whole of the apical segment closely punctured above, the head and thorax having a granular appearance; the base and apex of the 2nd segment very narrowly, and the apical margins of the

4th and 5th smooth and shining; the punctures on the 2nd segment running into longitudinal striæ; head broad and square; eyes ovate; thorax in front squarish, posteriorly constricted towards the apex. Black, the scape and basal joint of the flagellum of the antennæ, the thorax, and the coxæ and femora of all the legs red; the 3rd abdominal segment covered with a dense silvery pile above.

Hab. Borneo (*Smith*); Moolayit, Tenasserim (*L. Fea*). ♀. *Length* 5–7 mm.

43. **Mutilla sex-maculata**, *Swed.* (*nec Smith*) *Nouv. Act. Holm.* viii, 1787, p. 286; *Rad. & Sich. Hor. Soc. Ent. Ross.* vi, 1869, p. 246.

♀. Head and thorax closely punctured, with a thin scattered pubescence; abdomen densely pubescent; head orbicular; thorax truncate in front and posteriorly, from above irregularly rectangular, slightly broader posteriorly than in front, slightly constricted in the middle; abdomen massive, long, much longer than the head and thorax united. Black, the thorax above red; two oblong spots close to the base of the 1st abdominal segment, two others on its apical margin, and two on the 3rd segment, of snow-white pubescence.

Hab. Punjab; Allahabad; Barrackpore; Bombay. ♀. *Length* 11–17 mm.

44. **Mutilla agnata**, *André, Jour. Bomb. N. H. Soc.* viii, 1893, pp. 466, 479, ♀.

♀. Head, thorax, and abdomen finely and closely punctured, pubescent, the thorax nearly bare, with sparse erect fine hairs; head very orbicular, strongly convex in front, narrower than the thorax; eyes very large, subovate; thorax from above elongate, rectangular, the lateral margins slightly waved anteriorly, widely arched posteriorly, truncate, the truncation punctured; 1st abdominal segment very short, its posterior margin above depressed well beneath the base of the 2nd segment. Head black, covered with a rather thin short golden pubescence, the scape and basal two joints of the antennæ and the legs ferruginous; the apical portion of the flagellum brown; thorax red; abdomen black, the basal half and the narrow apical margin of the 2nd, and the whole of the rest of the segments above, covered with ferruginous golden pubescence, the anterior border of the golden pubescence on the 2nd segment medially emarginate.

Hab. Canara, Bombay Presidency. ♀. *Length* 7–12 mm.

*45. **Mutilla insularis**, *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, pp. 119, 133.

"♀. The antennæ and head black; thorax ferruginous; abdomen black, with two large oval united fasciæ on the second segment; the third segment and the apex of the fourth golden fulvous; legs black, the femora for the greater part ferruginous.

Head coarsely rugosely punctured; the hairs fulvous. Eyes large, oblong, reaching quite close to the top of the head, which is slightly convex. Antennal tubercles red, shining, finely striated. Antennæ inclining to piceous beneath towards the base; the third joint twice the length of the fourth; the second and third joint subequal. Thorax bluntly rounded at base and apex, twice the length of head, more strongly punctured than the head; the pleuræ punctured except at the apex; the sides of the thorax above rough, almost straight; pygidium longitudinally striated; the sides fringed with long fulvous hair; apical ventral segment slightly fringed with fulvous hair; the basal segment with large deep punctures; the others with the punctures much smaller. Legs covered thickly with long pale fulvous hairs, rufo-fulvous on the tarsi; the calcaria; the tibial spines four, pale.

"*Hab.* Trincomali; Ceylon. ♀. *Length* 11 mm."

*46. **Mutilla serratula**, *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, pp. 122, 133, pl. i, fig. 12.

♀. "Black; the thorax red; the scape and legs pale rufo-testaceous; the apex of second abdominal segment with a pale fulvous band (dilated in the middle). Head as wide as the thorax, coarsely punctured; the antennal tubercles impunctate, pale testaceous, as well as the clypeus; mandibles reddish, the apices piceous black; eyes large, oval, reaching close to the top of the head. The third joint of antennæ about one-half longer than the fourth. The sides of the thorax coarsely irregularly serrate, contracted in the middle, closely and coarsely longitudinally punctured; the apex of median segment above Λ-shaped; coarsely serrated; the acute apex terminating in a spine. The sides of the median segment serrate; the pleuræ impunctate. First abdominal segment not dilated; the apical pale testaceous, impunctate; the apical ventral segments fringed with pale fulvous hairs. Tibiæ and tarsi sparingly covered with testaceous hairs; the apices of femora fuscous.

"*Hab.* Poona. ♀. *Length* 5 mm."

47. **Mutilla dissimulanda**, *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 219, ♀.

♀. Head in front and on the vertex very coarsely rugose, cribrate and reticulate; thorax minutely reticulate; the plate of the scutellum wide, scarcely projecting; the margins and angles of the metathorax above with projecting papillæ, its posterior portion longitudinally striate with smaller projecting papillæ; pleuræ smooth and shining; the 1st abdominal segment above minutely punctured and aciculate, the ventral carina distinct; the 2nd, 4th, and 5th segments above pubescent, the first of these on the ventral side shining, coarsely and densely punctured, the remainder minutely transversely striate beneath, their apical

margins punctured; the anal segment minutely longitudinally striate, its apex emarginate; legs sparsely pubescent. Black; the mandibles in the middle, the scape of the antennæ at base and apex, the thorax, trochanters, and basal half of the femora rufo-ferruginous; abdomen opaque, sparsely clothed with black pubescence, dense on the 2nd, 4th, and 5th segments above; the 2nd segment has on its apical margin a narrow, and the 3rd segment a wide transverse band of silky white pubescence; the margins of the 3rd, 4th, and 5th ventral segments ciliated with silvery hairs; the legs sparsely clothed with yellowish pile, the tarsal spines rufo-testaceous.

Hab. Karen Hills, Burma. ♀. *Length* 11 mm.

48. **Mutilla rothneyi,** *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♀. Head and thorax coarsely and closely, and the abdomen finely and closely punctured, the punctures on the head and thorax running into longitudinal striæ; head subquadrate, as wide as the thorax; eyes very prominent, oval, slightly laterally compressed; collar much raised, on a level with the head and thorax; thorax from above rectangular, the sides set with sharp short spines, excavated below and smooth; the median segment with a single sharp central spine posteriorly; abdomen as long as the head and thorax, the basal segment constricted at its posterior margin. Head in front and on the vertex, and the thorax above dark red; the cheeks behind the eyes, the sides of the thorax, legs and abdomen black, the last with black pubescence and five circular pubescent white spots—one at the base above the 1st, two lateral and one central at the posterior margin of the 2nd, and one in the middle of the posterior margin of the 4th segment.

♂. Closely resembles the ♀, but the median segment is larger proportionally and more clearly marked off from the thorax, the lateral and posterior spines are smaller, and the sides of the thorax are more deeply excavated. Colour almost precisely similar, but the red is more diffused over the head, the pleuræ are covered with a thin sericeous silvery pile, and there are two additional spots on the abdomen, one in the middle of the apical margin of the 5th, the other on the 6th segment; wings absent (evidently accidentally lost) in the type and only specimen known.

Hab. Barrackpore, Bengal. ♀. *Length* 8 mm. ♂. *Length* 9 mm. Types in coll. Rothney.

A very distinct species; the ♂ is *M. contracta*, Cam.

49. **Mutilla pandora,** *Smith, Jour. Linn. Soc.* 1858, p. 85, ♀; *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 220.

♀. Head anteriorly minutely and closely striate, thorax finely and closely punctured, abdomen densely pubescent; head very little wider than the thorax; eyes ovate, the outer orbits straighter

than the inner; thorax in front transverse, posteriorly sharply truncate, the face of the truncation smooth but opaque. Black, the scape and first joint of the flagellum of the antennæ rufescent; the vertex and back of the head, the thorax, and the base of the 1st abdominal segment red; three large spots placed in a triangle on the 2nd segment above, a lunate elongate spot in the middle of its posterior margin, a band covering the 3rd segment, and the sides of the apical segment with silvery white pubescence.

Hab. Bhamo, Upper Burma (*L. Fea*); Borneo, Sarawak. ♀. *Length* 10 mm.

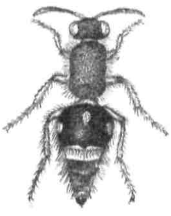


Fig. 4.
Mutilla pandora,
♀. $\frac{5}{2}$.

50. **Mutilla kanthellæ** *, *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, pp. 119, 124.

♀. Head and thorax closely and coarsely, and abdomen finely punctured and pubescent; head subglobose, not broader than the thorax; eyes ovate; thorax from above longish rectangular, the lateral margins crenulate and lightly emarginate; median segment rounded posteriorly, its lateral angles produced into a sharp well-marked tooth; abdomen broad, short, much broader than the thorax. Black, a spot on the vertex and the thorax in the middle deep red, the margins of the latter above, in front, and on the sides narrowly black; abdomen with five pubescent white spots—one at the apex of the basal segment, two sublateral close to the base, and two close to each other on the apical margin of the 2nd segment.

Hab. Kanthellai, Ceylon. ♀. *Length* 12 mm. Type in coll. Rothney.

51. **Mutilla maculiceps**, *André, Jour. Bomb. N. H. Soc.* viii, 1893, pp. 468, 481, ♀.

♀. Head, thorax, and abdomen pubescent; the head, thorax, and the basal segment of the abdomen somewhat coarsely punctured; head not strongly convex in front, compressed and narrowed at the back; thorax suboval, rounded anteriorly, narrowed and somewhat sloping posteriorly, the sides smooth. Head, thorax round the margins narrowly, and abdomen black, the thorax along the middle above ferruginous red; antennæ and legs black, the basal two segments of the abdomen beneath obscurely red; the pubescence on the middle of the thorax golden, on the abdomen black; a large spot on the front and vertex of the head, a spot on either side at the base and two similar smaller ones at the apex of the 2nd abdominal segment, with two still smaller ones on the 3rd segment, covered with snow-white pubescence.

Hab. Poona, Bombay Presidency. ♀. *Length* 7 mm.

* The original spelling of this name, *kauthellæ*, is a mistake or misprint.

52. **Mutilla nigrigena,** *André, Jour. Bomb. N. H. Soc.* viii, 1893, pp. 464, 471, ♀.

♀. Head, thorax, and abdomen closely and somewhat coarsely punctured, apical segment of the last longitudinally striate above; head orbicular, convex in front, wider than the thorax; this latter slightly convex above, rectangular, the sides parallel, its anterior margin more arched than the posterior. Head and abdomen black, the vertex and front of the head and the thorax red; scape of the antennæ and the legs reddish, the flagellum reddish (or black); abdomen with black pubescence, a round spot at the base and a semicircular spot and a fringe on the apical margin of the 2nd segment, of white pubescence; a similar but ill-defined spot of white pubescence in the middle of the 3rd and 4th segments, and a few scattered white hairs on the sides of and beneath the segments.

Hab. Canara, Bombay Presidency. ♀. *Length* 3½ to 5 mm.

53. **Mutilla reticulata,** *Smith, Cat.* iii, p. 35, ♀.

♀. Head and thorax very coarsely cribrate, sparsely covered with erect hairs; head slightly wider than the thorax; the eyes ovate and small; thorax from above rectangular, anteriorly and posteriorly nearly transverse, the sides excavated, the face of the emarginate portions coarsely punctured; abdomen longitudinally deeply striate, pubescent above. Head, legs, and abdomen black, the basal two segments of the last with transverse bands on their apical margins, and the 3rd segment with lengthened lateral spots of silvery pubescence.

Hab. India (*Smith*). ♀. *Length* 10 mm.

54. **Mutilla ocellata,** *Sauss. Ann. Soc. Ent. Fr.* 1867, p. 356, pl. 8, fig. 5, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 120.

♀. Head, thorax, and abdomen finely and closely punctured, the punctures finer on the abdomen than on the head and thorax; head broad, globose; eyes oval; thorax from above rectangular, the anterior and posterior margins nearly transverse, the lateral margins towards the apex crenulate and slightly emarginate; the pleuræ excavated; pro- and mesopleuræ smooth, metapleuræ punctured; abdomen short, pubescent. Head and abdomen black; thorax red; the vertex of the head between the eyes, also the forehead, suffused with red; legs black, the pubescence on them whitish; a small round median spot at the apex of the 1st, a larger spot at the apex of the 2nd, and another of a size between the two at the apex of the 3rd abdominal segment, of snow-white pubescence, the sides and apex of the abdomen with some white hairs.

Hab. Ceylon. ♀. *Length* 8–12 mm.

55. **Mutilla maculo-fasciata,** *Sauss. Hym. Nov. Reise,* p. 107, ♀.

♀. Head barely as wide as the thorax, densely punctured,

granular; thorax elongate-quadrate, somewhat wide, nearly half as long again as broad, the sides straight, above densely punctured; the mesopleuræ excavated; the metapleuræ punctured; 2nd abdominal segment above densely, beneath sparsely punctured; pygidium punctured and striolate. Head black, the vertex and front rufescent; antennæ rufo-fuscous; mandibles and clypeus fuscous black; thorax red; abdomen nigro-fuscous, a spot at the base of the 2nd segment and broad fascia on the 3rd segment of silvery pubescence, the remaining segments with whitish hairs; apical segment red; legs black, the femora rufescent.

Var. The whole of the head red, the fascia on the 3rd segment rupted in the middle.

Hab. Ceylon; Timor; Luzon. ♀. *Length* 7 mm.

56. **Mutilla variegata,** *Smith, Cat.* iii, p. 39, ♀.

♀. Head and thorax closely and somewhat coarsely rugose, the punctures running into reticulations on the disc of the thorax; this latter transverse in front, broadening towards the middle and suddenly and somewhat acutely narrowed posteriorly; the sides flat, punctured, with a broad oblique ridge in the middle; abdomen longitudinally, closely, and deeply striate above, pubescent; the 1st ventral segment without a carina. Black, the head, thorax, and legs with griseous, and the abdomen with black pubescence; the apical margins of the basal three segments with transverse bands of glittering golden hairs, continued on the underside on the 2nd and 3rd, and with a large round spot of the same on the middle of the 2nd segment above.

Hab. Burma, extending up to North China. ♀. *Length* 15 mm.

57. **Mutilla funeraria,** *Smith, Cat.* iii, p. 37, ♀.

♀. Head and thorax closely and finely punctured; head about as wide as the thorax; eyes large in proportion, ovate; thorax long, anteriorly produced into a collar or neck, posteriorly slightly narrowed and steeply sloped, the sides very slightly emarginate and smooth; abdomen still more finely punctured, pubescent above. Black, a lunate mark on the apical margin of the 2nd abdominal segment and the extreme apex of the abdomen with silvery white hairs.

Hab. Northern India (*Smith*). ♀. *Length* 11 mm.

58. **Mutilla arenaria,** *Fabr. Mant. Ins.* i, p. 312, 18; *Smith, Cat.* iii, p. 9, 53; *Rad. Hor. Soc. Ent. Ross.* viii, 1869, p. 242.
Mutilla desertorum, *Rad. Bull. Soc. Nat. Mosc.* 1865, p. 452, pl. viii, fig. 4, var.

♀. Head, thorax, and abdomen densely pubescent, the pubescence hiding most of the puncturing and sculpture of the body; head orbicular, scarcely so wide as the thorax; thorax strongly convex above, broader in front than behind, anteriorly

transverse with the lateral angles somewhat rounded, posteriorly concavo-truncate; abdomen petiolate, the basal segment small, narrowed, much depressed below the base of the 2nd segment; pygidium longitudinally and coarsely striate. Black, with black pubescence; a round spot on the front, the thorax above, a medial round spot near the base of the 2nd abdominal segment, a very broad transverse fascia, angularly emarginate in the middle anteriorly, on the apical margin of the same, and an ovate spot at the base of the 6th extending on to the apical margins of the 4th and 5th segments, covered with pale yellowish-white pubescence.

Hab. Karáchi; Bombay. ♀. *Length* 11–15 mm.

*59. **Mutilla semiaurata,** *Smith, Cat.* iii, p. 36, ♀ ♂.

"♀. Length 5 lines (about 11 mm.). Black, the head, mesothorax anteriorly, metathorax and legs clothed with silvery-white pubescence; the abdomen densely clothed with bright pale golden pubescence, except the apical segment, which is black, and has a central silvery-white pubescent spot; beneath, the margins of the segments are fringed with silvery hairs, the 2nd segment coarsely punctured and having a central longitudinal carina.

"♂. Clothed as in the other sex; the eyes ovate, the wings dark fuscous, palest towards their base.

"*Hab.* India (*Smith*)."

60. **Mutilla remota,** *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♀. Head, thorax, and abdomen coarsely but closely and evenly punctured, pubescent; thorax suboval, the emarginate hollows on the sides with the keel between them slight, the face of the emarginations as closely and coarsely punctured as the rest of the thorax. Black, the pubescence black; on the tibiæ and tarsi of the legs and the apex of the median segment golden yellow; abdomen with broad transverse bands of golden-yellow pubescence on the apical margins of the 1st and 2nd and the base of the 3rd segment, the 4th segment entirely covered with the same; the inner orbits narrowly, the outer orbits broadly, and the sides of the pronotum obscure red.

Hab. Trincomali, Ceylon. ♀. *Length* 15 mm. Type in coll. Rothney. This species may be the ♀ of *M. exacta*, Smith.

61. **Mutilla cicatrificera,** *André, Jour. Bomb. N. H. Soc.* viii, 1893, pp. 466, 477, ♀.

♀. Head, thorax, and basal two abdominal segments above very coarsely and closely, and the bases of the remaining segments finely punctured; the head and thorax covered with erect fine hairs; the abdomen densely pubescent; head orbicular, strongly convex in front; thorax from above rectangular, anteriorly transverse, but with a sort of collar between it and the head, the lateral margins crenulate, the apex somewhat sloping; 2nd ventral

segment with a medial carina at base. Head, thorax, and legs dark red; abdomen black, two large round confluent spots at base above, and the narrow apical margin of the 2nd segment, with broad apical bands on the remaining segments, covered with ferruginous golden pubescence.

Hab. Canara, Bombay Presidency. ♀. *Length* 11 mm.

62. **Mutilla aurifrons**, *Smith, Cat.* iii, p. 31, ♀.

♀. "Length 5 lines (about 11 mm.). Brownish-red, the sides of the thorax and abdomen having some dusky stains; the face and vertex densely clothed with short bright golden pubescence: the antennæ ferruginous, having the flagellum fuscous above, except the two or three basal joints. Thorax elongate-ovate, slightly narrowed behind; legs bright ferruginous and having a pale glittering pubescence. Abdomen: the second segment having two minute spots of golden pubescence, its apical margin having a fascia of yellowish-white pubescence, and being notched in the middle; the following segments have a thick marginal fringe of bright reddish-yellow pubescence."

Hab. India (*Smith*). Unknown to me.

*63. **Mutilla diversa**, *Smith, Cat.* iii, p. 32; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 118.

♀. "Head and thorax red, the former rounded at the sides and narrowed anteriorly; antennæ and mandibles red, the legs red and having a thin pale glittering pubescence; the head and the thorax above thinly covered with erect black hairs. Abdomen black; the basal segment having a patch and the 2nd and 3rd segments an ovate spot on each side on their apical margins of pale golden pubescence, beneath obscure red."

Hab. India (*Smith*). ♀. *Length* $4\frac{1}{2}$ lines=about 10 mm.

64. **Mutilla dives**, *Smith, Cat.* iii. p. 32, 172, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 118.

♀. Head rather finely longitudinally punctate and thinly pubescent; thorax more coarsely punctured, from above subrectangular, broader posteriorly than in front, the sides emarginate; the pleuræ smooth, with no dividing carinæ between the pro-, meso-, and metapleuræ; abdomen densely pubescent above, smooth and shining beneath, the 2nd–5th ventral segments fimbriated along their apical margins. Head and thorax red; legs dark rufo-piceous; tarsi paler, the pubescence pale golden, the calcaria white; abdomen black above with black pubescence, the 2nd segment has two lateral elongate oval spots of rich golden pubescence, the 3rd two quadrate silvery spots, the 5th a silvery spot on the apical margin above in the middle; beneath, the abdomen is testaceous red.

Hab. India (*Smith*). ♀. *Length* 6–10 mm.

65. **Mutilla chrysophthalma**, *Klug, Symb. Phys., Ins.* dec. 1, no. 17, pl. v, fig. 3; *Rad. & Sich. Hor. Soc. Ent. Ross.* 1869, p. 232.

♀. Head, thorax, and abdomen very roughly rugose, with scar-like ridges; thorax scarcely so broad as the head, rather elongate. Head, thorax, and abdomen red; head with the occiput covered with black, the front with white pubescence; thorax above with scattered black hairs; abdomen above slightly fuscous, with black pubescence, the 2nd segment with a large round spot on each side, 3rd and 4th segments with a medial smaller spot of golden pubescence; legs red, with white pubescence.

Hab. Ceylon; Arabia. ♀. *Length* 11 mm.

66. **Mutilla nudiceps**, *André, Jour. Bomb. N. H. Soc.* viii, 1893, pp. 466, 480, ♀.

♀. Closely resembles *M. agnata*, André. Differs in having the head red, concolorous with the thorax; the head and thorax covered with sparse erect brown hairs; the 1st segment of the abdomen longer, the ferruginous golden pubescence at base of the 2nd segment above reduced to two large, almost confluent round spots, and the legs reddish not ferruginous. The pygidium in *M. agnata* is punctured, in *M. nudiceps* longitudinally strongly striate.

Hab. Canara; Poona, Bombay Presidency. ♀. *Length* 9–12 mm.

*67. **Mutilla erythrocera**, *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, pp. 118, 131.

♀. "Antennæ, head, thorax, and legs for the greater part ferruginous; abdomen black, two large round maculæ on the 2nd segment, and the 3rd and 4th segments golden-fulvous. Head coarsely rugosely punctured, and sparsely covered with long blackish hairs; the hairs on the clypeus pale fulvous; antennal tubercles shining, impunctate. Palpi testaceous; eyes small, oval, in length about as long as the third antennal joint, and situated before the lateral middle line of the head, *i. e.* the space behind them is greater than in front. Vertex roundly convex. The third antennal joint not quite twice the length of the fourth, which is longer than the second. Head wider than the thorax. Thorax more coarsely punctured than the head; the mesonotum impunctate; the pro- and metapleuræ rugose; the sides of the mesothorax rough, very slightly concave; eyes [? sides] of median segment bluntly serrate. Abdomen about as long as the head and thorax united; the hairs on the 1st and 2nd segments black. Pygidium apparently finely punctured; ventral segment fringed with fulvous hairs. Legs: femora and coxæ piceous; tibiæ and tarsi ferruginous; the tibial spines (6 in a row) black; the hair long, and pale fulvous.

"*Hab.* Poona (*Wroughton*). ♀. *Length* 9 mm." Unknown to me.

68. **Mutilla regia**, *Smith, Cat.* iii, p. 38, ♀.
Mutilla comottii, *Gribodo, Ann. Mus. Civ. Gen.* (2ª) i, 1884, p. 365, ♀.

♀. Head and thorax closely and not very coarsely, abdomen more finely punctured; head globular, eyes large, oval; thorax above slightly convex, the lateral margins crenulate; the meso- and metapleuræ excavated, smooth and shining; median segment rounded posteriorly, with a very steep slope to the apex; abdomen long, longer than the head and thorax, pubescent. Head and thorax red; abdomen deep cærulean blue, a circular spot on the middle of the pronotum anteriorly and four spots along the median line of the abdomen (one basal, one apical on the 2nd segment, and an apical one on the 4th and 5th) of white silvery pubescence, a line on the apical margin and the sides of the 2nd segment also with silvery white pubescence.

Hab. Northern India. ♀. *Length* 9–11 mm. Type in the British Museum.

I cannot find any points of difference between *M. regia*, Smith, and *M. comottii*, Gribodo.

69. **Mutilla æstuans**, *Gerst. Peters, Reise, Mosamb.* v, p. 487, pl. 31, fig. 6, ♀; *Rad. & Sich. Hor. Soc. Ent. Ross.* vi, 1869, p. 223.

♀. Head and thorax rugose, strongly punctured; abdomen subsessile, pubescent; eyes ovate; thorax subquadrate, lightly constricted in the middle, truncate posteriorly; 1st ventral segment armed with two teeth and with the carina slightly emarginate. Head and thorax red; abdomen black, with black pubescence; antennæ reddish, legs dark brown; 2nd abdominal segment with a round spot of white pubescence on each side near the base, and the 3rd and 4th segments with broad medially interrupted bands of the same.

Hab. Ceylon; Mozambique; South Africa. ♀. *Length* 6–12 mm.

70. **Mutilla aurifex**, *Smith, New Sp. Hym. B. M.* p. 198, ♀ ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 117.

♀. Head and thorax coarsely longitudinally punctured; abdomen densely pubescent above, beneath smooth and shining, rather finely punctured, the posterior margins of the 2nd–5th segments fimbriated; eyes small, subovate; thorax from above irregularly rectangular, somewhat broader anteriorly than at the apex, the lateral margins with a strong conical tooth in the middle; the pleuræ smooth, the pleural carinæ well developed. Head and thorax red; the antennæ and legs brown, with golden pubescence; abdomen black with black pubescence, a spot, coming to a point posteriorly, at the base of the 1st segment, a broad band at the base of the 2nd, and the 3rd and 4th segments above completely, covered with golden pubescence; the band at the base of the 2nd segment is bi-emarginate posteriorly, and there is a line of black pubescence

down the middle of the 3rd and 4th segments; the fimbria on the segments beneath golden.

♂ similar, but wants the pubescent spot on the basal. and the black median line on the 3rd and 4th abdominal segments. It has also the median segment covered with golden pubescence, the sides of the segment being laterally flattened and depressed, and its posterior lateral angles tuberculate; the scutellum is prominent, projecting posteriorly, the margin incised and bearing a strong lateral tooth on each of its posterior angles; wings hyaline at base, fuscous beyond.

Hab. Bombay. ♀. *Length* 11–14 mm. ♂. *Length* 15–16; *exp.* 32–34 mm.

71. **Mutilla humbertiana**, *Sauss. Ann. Soc. Ent. Fr.* 1867, p. 353, pl. 8, fig. 2, ♀; *Rad. & Sich. Hor. Soc. Ent. Ross.* vi, 1869, p. 305.

♀. Head and thorax strongly and coarsely punctured, abdomen pubescent; head as wide as the thorax, orbicular; thorax rectangular, slightly constricted in the middle, transverse in front, roundly truncate posteriorly. Head and thorax of an obscure dark red; abdomen black, 2nd segment with a broad band at base and a narrow one on its apical margin, both bands medially interrupted, and 3rd segment with a complete band, of golden yellow pubescence; anal segment punctured and fringed with golden yellow hairs; antennæ reddish, with their apical joints black; legs brown, ciliated with golden hairs.

Hab. Trincomali, Ceylon. ♀. *Length* 10–14 mm.

72. **Mutilla placida**, *Smith, New Sp. Hym. B. M.* p. 198, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 120.

♀. Head small, not so wide as the thorax; the latter subovate, almost kite-shaped, being broad and rounded anteriorly and very considerably narrowed towards the apex, the lateral margins crenulate, toothed in the middle; head and thorax coarsely longitudinally punctured, the pleuræ emarginate and as coarsely punctured as the rest of the thorax. Head, thorax, and legs red; abdomen black, with black pubescence: the basal segment constricted and campanulate, forming a sort of pedicel to the rest of the abdomen; the basal three segments with broad transverse bands of golden pubescence, above, on their apical margins.

Hab. Bombay. ♀. *Length* 12 mm. Type in the British Museum.

73. **Mutilla aureo-rubra**, *Rad. & Sich. Hor. Soc. Ent. Ross.* vi, 1869, p. 304.

Mutilla egregia, *Sauss.* (*nec Klug*) *Ann. Soc. Ent. Fr.* 1867, p. 351, pl. 8, fig. 1, ♀.

♀. Head, thorax, and basal two segments of the abdomen coarsely punctured, the rest of the abdomen more sparsely and finely punctured; head nearly as wide as the thorax; thorax

elongate, rounded anteriorly, constricted posteriorly, carrying a little before the middle on each side a pointed tubercle; 1st abdominal segment petiolate, swollen posteriorly. Head and thorax dark red; abdomen black, sparsely pubescent; antennæ black; legs black, ciliated with golden yellow hairs; the 2nd and 3rd abdominal segments with transverse bands of golden pubescence.

Hab. Trincomali, Ceylon. ♀. *Length* 13–15 mm.

74. **Mutilla trichocondyla**, *André, Jour. Bomb. N. H. Soc.* viii, 1893, pp. 468, 483, ♀.

♀. Head, thorax, and the 2nd abdominal segment coarsely reticulate: head and thorax sparsely pubescent with stiff hairs, abdomen densely pubescent; head square, very nearly as broad as the thorax, the occiput transverse; thorax from above broader anteriorly than posteriorly, with two blunt triangular teeth on each side, the hinder the smaller, the posterior margin roundly truncate; the base of the 2nd abdominal segment bare and smooth. Black, the head and thorax dark red, the latter with the sides and apex narrowly edged with black, the scape of the antennæ and the legs brownish red, the flagellum ferruginous; the posterior margin of the 2nd, the whole of the 3rd, and the sides of the 2nd–5th abdominal segments covered with golden yellow pubescence, the band on the 2nd segment slightly interrupted in the middle.

Hab. Canara, Bombay Presidency. ♀. *Length* 13 mm.

75. **Mutilla bicincta**, *Sauss. Ann. Soc. Ent. Fr.* 1867, p. 355, pl. 8, fig. 4; *Rad. & Sich. Hor. Soc. Ent. Ross.* vi, 1869, p. 306.

♀. Head and thorax somewhat finely punctured, abdomen pubescent; head as wide as the thorax, orbicular; thorax from above broadly rectangular, with a slight constriction in the middle; abdomen subsessile. Head and thorax red; abdomen black, the posterior margins of the 2nd and 3rd segments with transverse bands of golden pubescence; the ventral carina on the 1st segment emarginate and studded with golden hairs; legs for the greater part red, with golden pubescence.

Hab. Ceylon. ♀. *Length* 13 mm.

76. **Mutilla kauaræ**, *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, pp. 119, 134.

♀. Head, thorax, and abdomen coarsely punctured, the head and abdomen pubescent, the punctures on the thorax running into longitudinal striæ, the pronotum anteriorly widely arched or subangular, the median segment posteriorly truncate, the truncation slightly convex, the sides of the thorax deeply emarginate, smooth; abdomen broad, not longer than the head and thorax united. Head, thorax, and legs red, abdomen black; the head and a broad transverse band on the posterior margins of the 2nd and 3rd abdominal segments covered with dense ferruginous golden pubescence; the

apex of the median segment, the legs, the base of the 1st abdominal segment, and the posterior margins of the 3rd and apical segments with erect golden hairs, the rest of the pubescence fuscous.

Hab. Ceylon. ♀. *Length* 11 mm. Type in coll. Rothney.

77. **Mutilla atomus**, *André, Jour. Bomb. N. H. Soc.* viii, 1893, pp. 463, 473, ♀.

♀. Head, thorax, and abdomen finely punctured, the punctures close on the thorax, more sparse on the head and abdomen; head orbicular, eyes rather small, antennæ massive, the head not quite so wide as the thorax; the thorax from above rectangular, slightly compressed in the middle, obliquely sloping at apex; abdomen with the apical segment longitudinally finely striate. Head, thorax, antennæ, and legs ferruginous red; abdomen black, the 2nd and following segments with bands, slightly enlarged in the middle, of white pubescence: of these bands, that on the 2nd segment only is well-marked, the others probably through attrition are ill-defined.

Hab. Canara, Bombay Presidency. ♀. *Length* 3 mm.

*78. **Mutilla denticollis**, *Motsch. Bull. Soc. Nat. Mosc.* xxxvi, pt. 2, 1863, p. 22, ♀.

"Opaque with a granular appearance, sparsely pubescent, red, with abdomen acuminate, black, a narrow fascia posteriorly, and the apex with a little white pubescence, 1st segment broadly brown in the middle; antennæ and legs rufo-testaceous; head round, convex, rugosely punctured; eyes large, black, not very prominent; thorax very little wider than the head, elongate, rectangular, rugose with a granular appearance, prominent, the lateral margins with six teeth, slightly constricted in the middle, the lateral angles produced; abdomen conical, densely punctured; the tibiæ pilose and furnished posteriorly with four long spines."

Hab. Nuwara Eliya, Ceylon. ♀. *Length* 2½ lines=about 6 mm.

*79. **Mutilla coromandelica**, *Motsch. Bull. Soc. Nat. Mosc.* xxxvi, pt. 2, 1863, p. 23; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 118.

♀. Closely resembling *M. denticollis*, Motsch., but narrower, more slender, with the sides of the thorax not dentate. Coloration similar to *M. denticollis*, but the abdomen without the brown tint anteriorly.

Hab. Madura, Southern India. Unknown to me.

*80. **Mutilla veda**, *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, pp. 123, 130.

♀. Very closely allied to *M. serratula*, Cam. (p. 26): differs in having the head red, and in having a spot on the 2nd abdominal segment; the pygidium is clothed with fulvous hairs; the thorax

has laterally a broad tooth roundly incised at the apex, the sides are not contracted nor serrate, only waved, and the median segment is rounded.

Hab. Poona (*Wroughton*). ♀. *Length* 5 mm. Unknown to me.

*81. **Mutilla pusilla**, *Smith, Cat.* iii, p. 37, ♀.

"♀. Length 2 lines (about 5 mm.). Head, thorax, and legs ferruginous; head about the same width as the thorax and strongly punctured. Thorax oblong-quadrate, roughly punctured; legs pale rufo-testaceous, the femora, tibiæ, and joints of the tarsi palest towards their bases; the legs sprinkled with a bright glittering silvery white pubescence; the calcaria white. Abdomen black, the extreme base and apex ferruginous; the 2nd segment having at its base a central ovate spot of golden pubescence; its apical margin fringed with silvery hairs, also a spot of the same colour in the middle of the following segments; beneath, the margins of the segments fringed with silvery hairs."

Hab. Northern India (*Smith*).

82. **Mutilla lunarifasciata**, *André, Jour. Bomb. N. H. Soc.* viii, 1893, pp. 466, 470, ♀.

♀. Head, thorax, and abdomen closely punctured, the punctures fine on the head, rather coarser on the thorax and base of the 2nd abdominal segment, with a tendency on the thorax to form longitudinal striæ; abdomen densely pubescent; head orbicular, strongly convex in front; thorax irregularly quadrangular, strongly convex above, anteriorly and posteriorly rounded, the sides waved at the upper margins, the posterior margin denticulate, with a short spine in the middle. Head and thorax dark reddish ferruginous, the scape of the antennæ brownish, the flagellum black; the legs pale ferruginous, with scattered yellow hairs; abdomen black, with black pubescence, 1st segment nearly covered by a large triangular spot, extending on to the base of the 2nd segment, of golden yellow pubescence, apical margins of the 2nd and 3rd segments with transverse lunate spots of the same pubescence, and the apical segment with a few yellow hairs.

Hab. Colaba, Bombay. ♀. *Length* 7 mm.

83. **Mutilla puerilis**, *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♀. Head broad, subquadrate above; eyes rather small, subcircular, the upper part slightly narrowed and prolonged upwards and backwards; head coarsely and rather distantly, thorax closely and coarsely, and abdomen finely punctured, pubescent; thorax from above oblong, the lateral margins lightly crenulate, the sides strongly excavated, smooth, the apex rounded; the pronotum in front almost transverse, the anterior lateral angles slightly produced. Head and thorax red, the face above the base of the antennæ

slightly fuscous; abdomen black with black pubescence, a large central spot of pale golden pubescence on the apical margins of the first three segments above, and the extreme apex of the abdomen clothed with white hairs.

Hab. Ceylon. ♀. *Length* 8 mm. Type in coll. Rothney.

*84. **Mutilla poonaensis,** *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, pp. 121, 129.

♀. "Head, thorax, and base of abdomen rufo-testaceous; abdomen black, with a purplish gloss, a small white mark on the second segment near the base and a band on its apex glistening white. Antennæ of moderate length, stout, the third joint not much longer than the fourth. Head a little broader than the thorax, closely and coarsely punctured, covered with white glistening hairs; the antennal tubercles impunctate; eyes large, oblong, reaching quite close to the head. Thorax much more closely punctured than the head; the prothorax rounded in front; the median segment with a gradual rounded slope to the apex, coarsely punctured; mesopleuræ shining, impunctate; the thorax covered with longish, fuscous to glistening white hairs. Abdomen subpetiolate, narrowed at the base; pygidium impunctate, covered with long fuscous and white hairs. Legs covered with long white hairs; the calcaria white. The sides of the thorax slightly narrowed from base to apex.

"*Hab.* Poona (*Wroughton*). ♀. *Length* 6 mm." Unknown to me.

*85. **Mutilla rufiventris,** *Smith, Cat.* iii, p. 36; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 121.

♀. "Head, thorax, and legs ferruginous; head subovate, rather wider than the thorax, sparingly and finely punctured, antennæ ferruginous. Thorax oblong, longitudinally rugose; legs rufo-testaceous, varying in depth of colour and having a sparing glittering white pubescence. Abdomen, the basal segment has an ovate spot in the middle of its apical margin, and in the middle of the apical margins of the 2nd and 3rd segments is a half-circular spot of silvery white pubescence; the entire abdomen thinly sprinkled with long white hairs; the extreme apex of the abdomen as well as beneath ferruginous.

"*Hab.* India (*coll. W. W. Saunders, Esq.*)." ♀. *Length* 2–3 lines =about 4·5–7 mm.

86. **Mutilla auropalliata,** *André, Jour. Bomb. N. H. Soc.* viii, 1893, pp. 467, 482, ♀.

♀. Head, thorax, and basal two segments of the abdomen coarsely punctured, the head and the anterior two-thirds of the thorax above densely pubescent, the pubescence hiding the sculpturing; head orbicular, convex in front, about as broad as the thorax; the thorax ovate, somewhat rounded in front, narrowed

posteriorly, the basal segment of the abdomen much narrowed, flat and somewhat obliquely truncate anteriorly and constricted at its apical margin. Head, thorax, legs, and basal segment of abdomen dark red, the rest of the abdomen black with black pubescence, the red colour on the head and anterior two-thirds of the thorax above covered with dense matted pale gold pubescence; the basal half of the 2nd abdominal segment dark red in certain lights, with a medial round spot at its base and three similar sub-apical spots above covered with silvery pubescence.

Hab. Poona. ♀. *Length* 8·5 mm.

*87. **Mutilla optima**, *Smith, Cat.* iii. p. 34, ♀.

♀. "*Length* 3 lines (=7 millim.). Head, thorax, and legs ferruginous; the pubescence on the face silvery, that on the vertex gold-coloured; tips of the mandibles piceous. Thorax subovate, narrowed behind, thinly sprinkled with golden hairs, and having at the sides a few long black and also a few white ones; the legs have a glittering silvery pubescence; the spines which arm the intermediate and posterior tibiæ externally, and also those at the apex of the joints of the tarsi, black; the calcaria pale testaceous. Abdomen black; the basal joint red, and having a spot above, a second ovate spot at the base of the 2nd segment and a third at its apex in the middle, and a larger one at each side, of bright glittering silvery pubescence; the 3rd segment has a central spot of the same colour and brilliancy; beneath rufo-piceous at the base, and having the apical margins of the 2nd and 3rd segments fringed with silvery white pubescence."

Hab. India (*Smith*).

*88. **Mutilla pulchriventris**, *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, pp. 121, 127.

♀. "Head and antennæ red, the latter covered on the top thickly with pale golden pubescence, hiding the ground-colour; thorax dull red; abdomen, a small spot longer than broad at the base and two broader than long on the apex of the 2nd segment, white; legs red, the femora and tibiæ more or less purple. Head wider than the thorax; eyes large, oval, reaching quite close to the top of the head . . . . Thorax elongate, rounded at the base and apex, concave near the middle, distinctly narrowed towards the apex, above coarsely punctured; the median segment with the punctures larger, deeper, rounder, and more widely separated; pleuræ coppery, the meso covered thickly with white hair; the mesonotum with long black hair, and with a short white glistening sparse pubescence. Abdomen oval, wider than the thorax, narrowed at base and apex, closely punctured and bearing long black hairs; pygidium impunctate, from the apex of the penultimate segment spring two masses of white hair. Legs covered with pale hair; there are three rows of tibial spines, the calcaria white.

Hab. Poona (*Wroughton*). *Length* 9 mm." Unknown to me.

89. **Mutilla metallica,** *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, pp. 120, 128.

♀. Closely allied to *M. regia*, Smith; differs in the head and thorax being somewhat more coarsely punctured, the pronotum anteriorly and the median segment posteriorly more rounded, and the basal segment of the abdomen narrowed at base almost into a short petiole. Head and thorax of a darker red than in *M. regia*, the head above and in front with glistening golden pubescence; abdomen deep cærulean blue, a spot at the base of the 2nd segment, two spots in the middle at its margin, and two smaller spots laterally at the base of the 4th segment, of white pubescence.

Hab. Trincomali, Ceylon. ♀. *Length* 8 mm.

90. **Mutilla perelegans,** *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♀. Head, thorax, and abdomen rugosely punctured, the punctures large, deep, oblong, and almost confluent in places on the head, thorax, and sides of the 2nd abdominal segment; the head and thorax with a thin covering of erect stiff hairs; the sides of the thorax excavated above the intermediate and above and a little behind the anterior coxæ, with a strong keel between the excavated portions, these latter smooth. Head and thorax red, the erect stiff hairs black, the pubescence beneath and on the legs glittering golden yellow; abdomen black, with black pubescence, a median circular spot of ferruginous pubescence close to the base of the 2nd segment above, and a lateral oblong spot of golden pubescence at its posterior margin, 3rd segment above entirely covered with golden pubescence.

♂. Similar, but with the median segment posteriorly emarginate, the sides prolonged backwards into conical well-marked tubercles; the 2nd abdominal segment wants the spot of ferruginous pubescence at base, but has the lateral marginal spots nearly meeting in the centre above, and the 4th as well as the 3rd segment is clothed with golden pubescence; wing dark fuscous, hyaline at base.

Hab. Western and Southern India; Tenasserim. ♀. *Length* 12 mm. ♂. *Length* 17; *exp.* 27 mm. Type in coll. Rothney.

91. **Mutilla pulchrina,** *Smith, Cat.* iii, p. 34, ♀.

♀. Head and thorax coarsely cribrate, with a few scattered hairs; eyes small, nearly round; thorax rectangular, more rounded in front than posteriorly, the sides slightly excavate, with two blunt projections along the upper margin, from each of which an oblique carina crosses the pleuræ; abdomen coarsely punctured; the 1st, 2nd, 5th, and following segments with sparse, and the 3rd and 4th with dense pubescence; the 1st ventral segment strongly carinated down the middle. Head, thorax, and legs dark purplish red; abdomen black, with black pubescence, the pubescence on the 3rd and 4th segments rich golden yellow.

♂ similar, with similar pubescence; the median segment short, reticulate, the sides produced back into long sharp tubercles. Head, thorax in front, and the legs red; median segment and abdomen black; an additional band of yellow pubescence on the apical margin of the 2nd segment; wings clear hyaline at base, fuscous beyond the basal nervure in the fore and the anal cell in the hind wing.

Hab. Madras. ♀. *Length* 17 mm. ♂. *Length* 15; *exp.* 28 mm.

92. **Mutilla taylori,** *André, Jour. Bomb. N. H. Soc.* viii, 1893, pp. 467, 469, ♀.

♀. Head and thorax coarsely punctured and sparsely covered with erect hairs, abdomen more densely pubescent; head nearly as wide as the thorax, orbicular; thorax rectangular, the sides parallel, irregularly denticulate; posterior margin transverse, denticulate above, with the middle tooth produced into a spine; sides of the thorax smooth, posteriorly shining, finely and closely punctured; 2nd abdominal segment densely punctured. Head brown, the front and vertex and the thorax red; scape of the antennæ and the basal joint of the flagellum, and the legs obscurely red; abdomen black, an oval spot in the middle of the 1st, a semicircular one at the apical margin of the 2nd, and a smaller one at the apical margin of the 3rd segment, of white pubescence.

Hab. Orissa (*Taylor*). *Length* 5 mm.

93. **Mutilla argentipes,** *Smith, Cat.* iii, p. 31, ♀.

♀. Head, thorax, and basal two abdominal segments coarsely reticulate punctate, the rest of the abdomen less coarsely punctured; head small, orbicular, not nearly so wide as the thorax; thorax much broader in front than posteriorly, anteriorly rounded, posteriorly roundly truncate, with an acute prominent tubercle on each side before the middle; abdomen petiolate, basal segment short, campanulate, its posterior margin much depressed below the roundly truncate anterior margin of the 2nd abdominal segment. Obscurely fuscous brown, with sparse fuscous pubescence, the thorax gradually changing into ferruginous posteriorly and covered with sparse short golden pubescence; basal two-thirds of the 2nd abdominal segment also ferruginous, with golden pubescence; a large round spot on the head, a spot in the middle of the 2nd abdominal segment, and a spot on each side near the apical margin, also a smaller round spot in the middle of each of the following three segments, covered with silvery white pubescence; legs black, with a little silvery pubescence above.

Hab. Bombay. ♀. *Length* 9–12 mm.

94. **Mutilla opulenta,** *Smith, Cat.* iii, p. 34, ♂.

♂. Head coarsely punctured, densely pubescent above and on the front, a hollow on each side of the base of the antennæ leading

to the clypeus, the depression and the clypeus smooth and shining and well below the plane of the front above the antennæ; thorax coarsely and closely punctured and densely pubescent; the scutellum with the sides raised obliquely and forming a tubercle at the apex; median segment above wide, flat, transversely truncate posteriorly, the sides emarginate; abdomen coarsely punctured, the apical margins of all the segments above and of the apical six beneath with transverse densely pubescent bands. Black, the base of the mandibles, the clypeus, the scape of the antennæ, tegulæ of the wings, the legs, and the basal segment of the abdomen chestnut-red, the pubescence rich chrome-yellow, on the scutellum and apical two abdominal segments rufo-fuscous; wings clear hyaline at base, fuscous suffused with purplish beyond the basal nervure in the fore, and the anal cell in the hind wing.

Hab. India (*Smith*). ♂. *Length* 17; *exp.* 28 mm.

95. **Mutilla schlettereri,** *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 230, ♂.

♂. Head and front longitudinally finely striate, with a narrow impressed line from the anterior ocellus to between the bases of the antennæ; thorax rugosely punctured, the punctures on the scutellum fine and delicate; the median segment rounded posteriorly, with a steep slope, narrowed towards the apex and delicately reticulate; abdomen very finely punctured. Black, covered with a thin, short, erect, silvery pubesence, the posterior half, sometimes the whole, of the 1st abdominal segment and the 2nd and 3rd segments red, the pubescence forming transverse, somewhat ill-defined bands on the apical margins of the 4th and 5th segments above; wings light fusco-hyaline, clearer towards the base; the tegulæ very large, lamellar, and testaceous along their outer margins.

Fig. 5.—*Mutilla schlettereri*, ♂. $\frac{3}{1}$.

Hab. Karen Hills, Burma; Sikhim, 1000 ft. ♂. *Length* 11–12; *exp.* 24 mm. A very distinct species.

96. **Mutilla stephani,** *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 227, ♂.

♂. Head, the vertex minutely rugose punctate; mesonotum above coarsely and deeply punctured, bearing four longitudinal, parallel, more or less distinctly marked and broad lines, with also a medial carina; median segment widely reticulate, with a central longitudinal furrow at base; abdominal segments sparsely and minutely punctured, the basal three shining, the second bearing a prominent transversely compressed gibbosity above, the ventral carina on the basal segment barely projecting, sublinear; the

pleuræ, legs, and part of the margins of the ventral segments of the abdomen with yellowish-grey pile. Black, the basal three segments widely rufo-ferruginous; head in front, cheeks, and clypeus covered with silvery, the vertex with golden pile; the pronotum on its posterior margin widely, the base of the median segment and submarginal fasciæ on the 3rd and 4th abdominal segments clothed with pale golden-yellow pile; wings smoky violaceous, the base hyaline; the tegulæ broad, nigro-piceous.

Fig. 6.—*Mutilla stephani*, ♂. $\frac{4}{1}$.

Hab. Karen Hills, Burma. ♂. *Length* 12–16 mm.

97. **Mutilla analis**, *Lepel. Hym.* iii, p. 630; *Rad. & Sich. Hor. Soc. Ent. Ross.* vi, 1869, p. 284; *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 222.

♂. Head, thorax, and abdomen pubescent, the pubescence on the median segment dense, short, and matted; head above shining, finely punctured; mesonotum strongly punctured, rugose, with longitudinal carinæ; scutellum tuberculate, not so prominently as in *M. dimidiata*; median segment reticulate, roundly truncate posteriorly, with a central longitudinal and two lateral outwardly divergent short carinæ at base; abdomen above sparsely punctured, the punctures shallow. Black, the pubescence silvery, the basal four segments of the abdomen red, the base of the 1st segment fuscous black; wings dark fusco-hyaline, clearer towards their base.

Hab. Bengal; Kumaun; Delhi; Allahabad; Madras; Pegu Hills, Lower Burma; Bhamo, Upper Burma; Tenasserim; Ceylon. ♂. *Length* 11–13; *exp.* 26–28 mm.

98. **Mutilla subanalis**, *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 223, ♂.

♂. Head and thorax coarsely, abdomen sparsely punctured and shining; head, on the face, front and vertex, the pronotum, the mesopleuræ, and the median segment above densely, the scutellum and legs less densely pubescent; the front between the antennæ furnished with a short spinous process; posterior margin of the pronotum slightly arched; mesonotum with two parallel longitudinal shallow furrows, the posterior lateral angles slightly raised and prominent; scutellum somewhat raised and rounded; the tegulæ of the wing large and dilated. Black, the abdomen rufo-ferruginous, the 1st, 6th, and 7th segments black; the pubescence on the head and thorax silvery grey, darker on the scutellum and legs; on the first five abdominal segments it is fulvous, deepening to golden yellow on their posterior margins, and black on the apical two segments; wings light fuscous, their base hyaline, the

fore wing iridescent; the radial cell short, the apex truncate, three complete cubital cells not extending beyond the apex of the radial cell.

Hab. Upper Burma. ♂. *Length* 9–10; *exp.* 21 mm.

99. **Mutilla tornatorei,** *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 230, ♂.

♂. Resembles *M. analis*, Lepel., but is a stouter-built insect, with the head and thorax more punctured and rugose, the median segment with wider coarser reticulations, and the sparse puncturing on the abdomen confined to the basal two segments, rest of the segments smooth and shining. Black, the 2nd, 3rd, and 4th abdominal segments, and apical two-thirds of the 5th above red; wings dark fuscous, clearer and hyaline towards base.

Hab. Rangoon district, Lower Burma. ♂. *Length* 12; *exp.* 26 mm.

100. **Mutilla pilosella,** *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 220, ♂.

♂. Head and thorax coarsely rugose punctate; inner orbits of the eyes triangularly emarginate; posterior margin of the pronotum obtusely arched; mesonotum above longitudinally bisulcate; scutellum raised, prominent, its apex obtuse; tegulæ of the wings large and shining: abdomen smooth and shining. Black; head, thorax, and legs clothed with a dense white pubescent pile; the first five abdominal segments red, covered with white and yellow pile; wings with more than the apical half fuscous, the base subhyaline, the fore wing with three complete cubital cells, the radial cell lanceolate, its apex slightly rounded; tegulæ piceous.

Hab. Upper Burma. ♂. *Length* 10; *exp.* 22 mm.

101. **Mutilla unifasciata,** *Smith, Cat.* iii, p. 38, ♂.

♂. Head and thorax anteriorly closely and coarsely punctured, the punctures running into reticulations on the vertex and mesonotum, the disc of the latter with five parallel longitudinal carinæ; scutellum prominent, raised; median segment depressed, coarsely and widely reticulate, slightly narrowed posteriorly, with a steep slope to the apex, and three central parallel longitudinal carinæ from base; the whole head and legs covered very sparingly with long soft hairs; abdomen, the basal two segments distantly punctured and very slightly pubescent, the 3rd segment densely, the remaining segments slightly pubescent. Black, the basal two segments bright red, the pubescence silvery white, on the apical four segments black; wings fuscous, hyaline at base.

Hab. Northern India (*Smith*). ♂. *Length* 16; *exp.* 36 mm.

102. **Mutilla josephi,** *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 228, ♂.

♂. Vertex of the head shining, scarcely punctured, the front

densely pubescent; pro- and mesonotum and disc of scutellum lightly punctured, sparsely pubescent, densely so on the margin of the pronotum; median segment sparsely pilose, broadly reticulate and punctured, bearing a wide lanceolate furrow; the disc of the mesonotum with two longitudinally impressed lines; the basal and 2nd segments of the abdomen above shining, somewhat smooth, the 2nd and remaining segments densely punctured beneath; wings dark fuscous, effulgent; the 1st ventral segment with a linear, somewhat prominent carina. Black; the base and apical margin of the 1st abdominal segment, and more than half the base above and below of the 2nd, with the apex of the scape of the antennæ and the tegulæ of the wings widely, rufo-ferruginous; the margin of the 2nd abdominal segment, and wide fasciæ on the 3rd and 4th segments covered with golden pubescence, the apical segments with black pubescence; the pubescence on the head and thorax golden.

Hab. Karen Hills, Burma. ♂. *Length* 12; *exp.* 26 mm.

103. **Mutilla gribodoi,** *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 229, ♂.

♂. Head, pro- and mesonotum, and scutellum coarsely and densely punctate, the punctures running into reticulations: the scutellum somewhat raised and gibbous; the mesonotum with two parallel impressed lines, postscutellum rugose, substriolate; median segment with a lanceolate furrow above, but on account of the pubescence barely distinguishable; the ventral carina on the 1st abdominal segment not much produced; 1st and 2nd abdominal segments coarsely and strongly, the remaining segments somewhat smooth and sparingly punctured. Head, thorax, and legs black; abdomen red, variegated with black; head, pronotum, and the margins of the abdominal segments with griseous yellow pile; median segment clothed densely with silky white, and legs and base of the abdomen sparingly with long griseous pubescence; the 2nd and 3rd segments of the abdomen entirely, the apical half of the 1st sometimes widely, rufo-ferruginous, often entirely black or entirely red; wings fuscous, with a violet effulgence.

Hab. Rangoon District; Karen Hills, Burma. ♂. *Length* 11–12 mm.

104. **Mutilla handlirschi,** *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 227, ♂.

♂. Vertex of the head opaque, sparsely pubescent; pronotum smooth, posterior angles minutely punctured; mesonotum densely punctured, with two longitudinal furrows, the suture dividing off the scutellum deep and minutely punctured, metanotum reticulate, the median area above distinct, mesopleuræ obsoletely reticulate; wings light fuscous, pubescent, the tegulæ small and somewhat round; abdomen above and below rugosely punctate, sparsely pubescent, the basal segment narrow, bell-shaped, the 2nd slightly

gibbous. Black, the basal two and base of the 3rd abdominal segment red, the pubescence griseous.

Hab. Karen Hills. ♂. *Length* 5 mm.

105. **Mutilla emergenda,** *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 222, ♂.

♂. The front near the base of the antennæ incrassate and projecting; the vertex of the head punctured; pronotum opaque, reticulate and rugose; mesonotum above shining, coarsely and deeply punctured, bearing two deep parallel longitudinal furrows; the median dorsal line slightly raised, the two lateral ones obsoletely marked; scutellum raised, prominent, obscurely spined, coarsely punctured, its apex smooth and shining, obliquely truncate; the posterior lateral angles of the mesonotum at apex slightly raised and prominent; tegulæ of the wings large, bell-shaped. Black, head in front, cheeks, pronotum, the mesopleuræ, and the legs with long and sparse, and the metanotum with short and dense silvery white pubescence; 1st abdominal segment black, shining, and smooth, sparsely and coarsely punctured at wide intervals, its posterior margin ferruginous, with white pubescence; 2nd–5th segments rufo-ferruginous, the apical half of the 5th black, with white pubescence; apical two segments black, with black pubescence; wings obscurely fusco-violaceous, the fore wing with three complete cubital cells.

Hab. Upper Burma. ♂. *Length* 12 mm.

106. **Mutilla indostana,** *Smith, Cat.* iii, p. 33; *Cam. Mem. Manch L. Ph. Soc.* (4) v, 1892, p. 119.

♂. Head somewhat finely, thorax more coarsely punctured and rugose; mesonotum convex, broad, with three longitudinal parallel carinæ; scutellum tuberculate, rising to an acute point posteriorly; median segment flattish above, depressed below the level of the postscutellum, broad and somewhat square, sharply but obliquely truncate posteriorly, the whole surface coarsely reticulate, a medial broad line from base above, not reaching the verge of the truncation, smooth, bordered by parallel carinæ; abdomen, the basal two segments rather coarsely, the remainder more finely punctured. Black, the 2nd–5th segments of the abdomen red; the head, thorax, median segment, legs, base and apex of the abdomen studded with black, the 2nd–5th segments with glittering golden yellow hairs; wings very dark fuscous with a purple effulgence.

Hab. India; Ceylon (*Yerbury*). ♂. *Length* 21; *exp.* 43 mm.

107. **Mutilla emeryi,** *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 225, ♂.

♂. Head on the vertex punctured, the inner margin of the eyes with a sinus; the front, clypeus, cheeks, and scape of the antennæ densely, and the mandibles sparsely pubescent, the pubescence on

the mandibles long; the posterior margin of the pronotum obtusely arched, with a wide pubescent fascia; mesopleuræ densely, the legs sparsely pubescent; mesonotum coarsely punctured above, the disc with a median longitudinal carina, and other parallel carinæ, two on each side, the outer ones short, the posterior lateral angles subprominent; the tegulæ large, campanulate; scutellum slightly elevated, reticulate; the anterior half of the median segment above densely pubescent, hiding the sculpture of the surface; abdomen smooth and shining, minutely and sparsely punctured, pubescent; the ventral anal segment with a round concave impressed mark, and close to the apex two curved spines. Black, the abdomen rufo-ferruginous, the base of the 1st, the apex of the 6th, and the whole of the apical segment black; the pubescence on the head white, on the thorax fulvous white, and on the abdomen griseous, with the margins of the segments golden; the anal segment with a little reddish hair; the calcaria of the tibiæ white, the spines on the tarsi ferruginous; the wings fuscous, lightly suffused with purplish effulgence, the radial cell lanceolate, the apex truncate, and three complete cubital cells not extending beyond the apex of the radial cell.

Hab. Bhamo, Upper Burma. ♂. *Length* 15; *exp.* 31 mm.

108. **Mutilla exiloides,** *Magr. Ann. Mus. Civ. Gen.* (2_a) xii, 1892, p. 232, ♂.

♂. Head, viewed from the front, subtriangular above, flat and sloping backwards, longitudinally finely striate; thorax densely punctured and rugose, median segment somewhat coarsely reticulate: abdomen elongate, slender, fusiform, the bases of the segments sparsely punctured and shining. Jet-black, covered more or less densely with silvery white pubescence, which forms dense silvery transverse bands on the basal four abdominal segments above; the apical three segments with black pubescence; wings fuscous with a purple effulgence, hyaline at base.

Hab. Karen Hills, Burma. ♂. *Length* 12; *exp.* 25 mm.

109. **Mutilla circumscribenda,** *Magr. Ann. Mus. Civ. Gen.* (2^a) xii, 1892, p. 233, ♂.

♂. Extremely close to *M. exiloides*, of which it may be only a larger form. The head is not so prominently subtriangular, produced backwards; the abdomen is not so slender, and the basal three (not four) segments only are banded with silvery white pubescence.

Hab. Karen Hills, Burma. ♂. *Length* 14–15; *exp.* 28 mm.

110. **Mutilla discreta,** *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).
Mutilla nigra, *Bingh.* (*nec Smith*) *A. M. N. H.* (6) xvi, 1895, p. 440.

♂. Head, thorax, and abdomen pubescent; head and pronotum finely and closely, mesonotum, scutellum, and postscutellum coarsely, and abdomen somewhat more finely and distantly punctured; the median segment posteriorly rounded, with a steep slope,

the punctures on the middle above very large, coarse, and almost confluent; the scutellum prominent, the tegulæ large; the mesonotum above the tegulæ, longitudinally and broadly grooved. Black, the pubescence white and glittering, forming narrow bands or fringes on the posterior margins of the first four abdominal segments; wings fuscous, hyaline at base, nervures dark brown, tegulæ black.

Hab. India; Burma; Tenasserim, and the Malayan region as far as the Philippines. *Length* 11–12; *exp.* 22–23 mm.

111. **Mutilla cariana,** *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 231, ♂.

♂. Head and thorax somewhat coarsely punctured and rugose; median segment rounded, reticulate posteriorly; abdomen finely punctured and shining; scutellum produced posteriorly, transverse, with a dentate process at the lateral angles. Black, the scape and 1st joint of the flagellum of the antennæ rufescent, the thorax red; abdomen thinly pubescent, a transverse band on the posterior margin of the 2nd and the whole of the 3rd segment above covered with silvery pubescence; wings hyaline at base, light fuscous for three-fourths of their length towards the apex, the costal margin of the fore wing darker fuscous.

Hab. Karen Hills, Burma. ♂. *Length* 9·5; *exp.* 20 mm.

112. **Mutilla antennata,** *Smith, Cat.* iii, p. 31, ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 116.

♂. Head, thorax, and abdomen punctured, the abdomen sparsely pubescent; head subtriangular above, with three shallow grooves down the front, not as wide as the thorax; eyes emarginate; thorax transverse anteriorly; tegulæ large, rounded posteriorly; median segment with a rounded slope at the back and a central longitudinal narrow groove bordered by a carina on either side. Head and abdomen black, thorax red; antennæ fusco-ferruginous; tegulæ pale along the posterior margins; abdomen with the segments clothed with white hairs, in some specimens forming broad bands on the apical margins of the first three segments; legs black; wings hyaline, broadly fuscescent along their apical margins.

Hab. India (*Smith*); Pegu Hills, Burma. ♂. *Length* 10; *exp.* 22 mm.

113. **Mutilla dilecta,** *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♂. Closely resembles *M. antennata*, Smith, of which it may be only a variety: differs chiefly in having the median segment shorter, more rounded posteriorly and more coarsely reticulate, in the antennæ being slightly thinner, and in the abdomen being more sparsely punctured. In colour it differs in wanting the three transverse bands of pale golden pubescence on the abdomen, and in having the tegulæ black, not red.

Hab. Barrackpore, Bengal. ♂. *Length* 8; *exp.* 13 mm. Type in coll. Rothney.

114. **Mutilla perversa,** *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♂. Head and thorax finely punctured, thinly pubescent; median segment coarsely reticulate; abdomen smooth and shining, the pubescence, especially on the apical four segments, longer and closer than on the head and thorax; the scutellum and postscutellum raised, prominent, and coarsely punctured. Head of a dark obscure reddish black, thorax red, abdomen black, the pubescence cinereous; wings fusco-hyaline, nervures testaceous, tegulæ red.

Hab. Barrackpore, Bengal. ♂. *Length* 5; *exp.* 10 mm. Type in coll. Rothney.

*115. **Mutilla miranda,** *Smith, Cat.* iii, p. 33, ♂.

"♂. Length 6 lines (= 13·5 mm.). Head ferruginous, narrower than the thorax; eyes emarginate; antennæ black. The prothorax and mesothorax ferruginous; metathorax and thorax beneath as well as the legs black, the latter clothed with pale glittering pubescence; the metathorax broad, produced at its lateral angles; the wings brown, their base hyaline. Abdomen black, the second segment having on each side a large spot of white pubescence, the third and fourth segments clothed with white pubescence."

Hab. India (*Smith*).

116. **Mutilla provida,** *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♂. Head, thorax, and abdomen finely and rather closely punctured, thinly pubescent, the punctures on the mesonotum coarser than on the rest of the body; median segment rounded posteriorly, with a steep slope to the apex, coarsely reticulate above. Black, the prothorax above and on the pleuræ, and the mesonotum red; the pubescence white; the wings fusco-hyaline, nervures dark testaceous, tegulæ red.

Hab. Bombay. ♂. *Length* 7; *exp.* 13 mm. Type in coll. Rothney.

117. **Mutilla sejugoides.**

Mutilla (Dasylabris) sejugoides, *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 234, ♂.

♂. Head, mesonotum, scutellum, postscutellum, and abdomen somewhat coarsely, pronotum finely and closely punctured. Head, thorax, and abdomen more or less pubescent; head from above broad, flattish, almost square; mesonotum with two abbreviated longitudinal furrows bounded by fine carinæ on each side; median segment reticulate, rounded posteriorly; abdomen with the 1st segment narrowed into a sort of petiole, which viewed sideways is subapically swollen above as in certain forms of Social Wasps (*Icaria*). Black, the pro- and mesonotum and pro- and mesopleuræ red, the pubescence black, the transverse bands on the apical

margin of the petiole and following two segments silvery white; wings dark fuscous with a purple effulgence.

Hab. Bhamo, Upper Burma; Karen Hills. ♂. *Length* 12–14; 27 mm.

118. **Mutilla rufo-dorsata**, *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♂. Head, pronotum in front, the median segment above, and basal segment of abdomen densely pubescent; head and thorax closely and rather coarsely, and abdomen more finely punctured; median segment short, posteriorly and laterally truncate; the inner orbits of the eyes above notched, making the eyes almost reniform; head broad, nearly transverse posteriorly. Black, the pubescence hoary white; the mesonotum and scutellum dull dark red; the abdomen obscurely dark blue; wings fuscous, hyaline at base, nervures dark brown, tegulæ black.

Hab. North-West Provinces. ♂. *Length* 13; *exp.* 24 mm. Type in coll. Rothney.

119. **Mutilla yerburyi.**

Mutilla yerburghi *, *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, pp. 123, 135.

♂. Head, thorax, and abdomen closely and not very coarsely punctured, pubescent: the mesonotum with two abbreviated longitudinal parallel grooves; median segment short, rounded posteriorly and coarsely reticulate; abdomen with the 1st segment narrowed and petiolate at base and slightly constricted at apex. Metallic blue, the pubescence white; the antennæ and tarsi fuscous black; wings hyaline, nervures brown, tegulæ blue.

Hab. Trincomali, Ceylon. ♂. *Length* 11; *exp.* 18 mm.

120. **Mutilla pedunculata**, *Klug, Symb. Phys., Ins.* dec. 1, no. 24, pl. 5, fig. 10; *Smith, Cat.* iii, p. 12.

♂. Head sparsely and finely, thorax and basal two segments of the abdomen more closely and coarsely punctured, the apical segments smooth, with fine long soft pubescence; the antennæ long, filiform; the vertex raised, with a deep short furrow behind each posterior ocellus; mesonotum with two parallel longitudinal grooves; median segment rounded posteriorly, rather coarsely reticulate; the basal segment of the abdomen at base narrowed into a petiole, its apical margin slightly constricted. Head, thorax, and basal segment of abdomen light brownish red, antennæ and legs pale testaceous red, 2nd and following segments of the abdomen black, pubescence whitish; wings hyaline, the apex of the fore wing light fuscous, nervures pale testaceous, tegulæ red.

Hab. Arabia; Egypt; Western India; Ceylon. ♂. *Length* 10; *exp.* 11 mm.

* Owing to a misapprehension, I fancy, Mr. Cameron has misspelt Col. Yerbury's name. I restore the true spelling.

Family THYNNIDÆ.

The insects belonging to the typical genus *Thynnus* are chiefly Australian, none being found within our limits. The males of all the *Thynnidæ* are winged, the females apterous. Two Indian genera, *Methoca* and *Iswara*, are related to *Thynnus* and are classed generally in the family *Thynnidæ*. *Iswara* is also allied in form and in the venation of the wings to *Myzine*, a genus of the *Scoliidæ*.

Head in female small, in male the width of the thorax; thorax in female subrectangular, constricted posteriorly, in male oval, the pronotum reaching back to the base of the wings; abdomen more or less massive, the anal segment in the male of the two genera found in India with an up-curved spine.

Key to the Genera.

a. Margins of the abdominal segments strongly constricted in the male	METHOCA, p. 52.
b. Margins of the abdominal segments not constricted in the male	ISWARA, p. 54.

Genus METHOCA.

Methoca, *Latr. Hist. Nat. Ins.* xiii, p. 268, ♀ (1805).
Mutilla, pt., *Jurine, Hym.* p. 266 (1807).
Tengyra, *Latr. Gen. Crust. et Ins.* iv, p. 115, ♂ (1809).

Type, *M. ichneumonoides*, Latr.

Range. Both hemispheres.

♀. Head subglobose; eyes oval; ocelli in a triangle on the vertex; antennæ filiform, inserted low down just above base of clypeus, their bases somewhat widely separated, the flagellum about the length of the thorax; clypeus subtriangular; mandibles curved. Thorax doubly constricted, rounded at the base and apex; legs long and slender, the coxæ very robust; femora subclavate; the tarsi elongate. Abdomen ovate, petiolate.

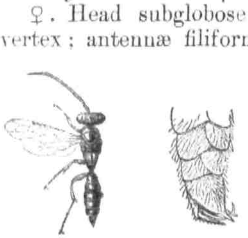


Fig. 7.
Methoca smithii, ♂. $\frac{3}{2}$.

♂. Head transverse, broad, flat anteriorly, convex behind; eyes prominent; ocelli large; antennæ filiform, the scape short, the joints of the flagellum beyond the 3rd slightly arched. Thorax elongate oval, sometimes considerably narrowed posteriorly; fore wing with one radial and three cubital cells, the radial cell elongate, the apex nearly reaching the apex of the wing, the first transverse cubital nervure faint, in some specimens almost obsolete, the 2nd cubital cell narrowed towards the marginal, the 3rd cubital cell the longest and narrowed at apex towards the marginal; legs moderately

long, very slender. The abdomen elongate, subdepressed and flattened above, the margins of the segments strongly constricted; anal segment with an up-curved spine.

So far the female of only one species has been recorded from India. A key to the males of the three known Indian species is given.

Key to the Species.

a. Antennæ and legs black.	
a'. Anterior tibiæ with a yellow stripe in front. .	*M. orientalis*, p. 53.
b'. Anterior tibiæ entirely black	*M. smithii*, p. 53.
b. Antennæ red; legs black variegated with red . .	*M. rugosa*, p. 54.

121. **Methoca bicolor**, *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♀. Head, thorax, and abdomen smooth and shining; the face, the sides of the thorax, the legs, and abdomen thinly pubescent, the base of the scutellum transversely and the sides obliquely striate; the antennæ are stout, the base of the joints constricted, the apical joints very gradually getting thicker. Red, the head black, the basal joints of the antennæ red; the legs dark castaneous, almost black; the 2nd and following segments of the abdomen black, the extreme apex rufescent.

Hab. Barrackpore, Bengal. ♀. *Length* 7 mm. Type in coll. Rothney.

*122. **Methoca orientalis**, *Smith, Cat.* iii, p. 66, ♂.

"♂. Length 7 lines. Black; head coarsely punctured; the base of the mandibles yellow; the clypeus and mandibles covered with long cinereous pubescence; the entire insect is thinly covered with similar pubescence, which is most dense on the sides of the metathorax; the thorax strongly punctured, closely so on the metathorax, which has a central abbreviated impressed line at the base; the anterior tibiæ have a yellow stripe in front; the calcaria pale testaceous, the claws ferruginous; wings fusco-hyaline, the nervures black. Abdomen black, with a slight metallic lustre, finely and distantly punctured, the margins of the segments constricted, the extreme lateral margins rufo-piceous."

Hab. Northern India (*Smith*). Unknown to me.

123. **Methoca smithii**, *Magr. Ann. Mus. Civ. Gen.* (2ᵃ) xii, 1892, p. 259.

Methoca orientalis, *Smith, Trans. Ent. Soc.* 1875, p. 35, ♂ (*nec Smith, Cat.* iii. p. 66, ♂).

♂. Head, mesonotum, scutellum, and postscutellum finely and closely punctured; pronotum and abdomen smooth, the latter polished and shining; clypeus with its anterior margin waved, and with a small tubercle at base; mesonotum with two parallel impressed lines on the disc and transversely striate posteriorly;

median segment very coarsely rugose; basal segment of abdomen narrowed, remainder with a remarkably deep constriction between each pair above and below. Black; head, thorax, and abdomen (the abdomen especially beneath) covered with a thin soft hoary pubescence; antennæ opaque, dull black, very massive proportionately; legs with the tibiæ and tarsi piceous; wings hyaline and iridescent, nervures and tegulæ dark testaceous.

Hab. Bengal; Karen Hills, Burma; Tenasserim. ♂. *Length* 7; *exp.* 12 mm. ♀ unknown.

124. **Methoca rugosa**, *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♂. Head closely and coarsely punctured; antennæ incrassate, opaque; pronotum transversely striate, with a broad posterior smooth margin; mesonotum, scutellum, postscutellum, and median segment coarsely reticulate, the last obliquely but sharply truncate at apex; abdomen smooth and shining above, sparsely punctured at the sides, the margins of the segments with deep subapical transverse constrictions. Jet-black; the scape and basal four joints of the antennæ, the trochanters, femora, tibiæ, and tarsi of the anterior, and the apex of the femora, with the underside of the tibiæ of the intermediate legs, red; a little pubescence on the underside of the scape of the antennæ, and the apex of the mandibles reddish; wings hyaline for nearly half their length from base, fuscous beyond.

Hab. Ceylon. ♂. *Length* 16; *exp.* 24 mm. Type in coll. Rothney.

Genus **ISWARA**.

Iswara, *Westw. Trans. Ent. Soc.* (new ser.) i, p. 232 (1851).

Type, *I. luteus*, Westw.

Range. India.

Head moderately large; eyes with the inner orbits straight, barely emarginate; clypeus small, bilobed; labrum concealed; mandibles slender, curved, the apex acute and with a small tubercular tooth on the inside; labial palpi 3-jointed, the joints subequal; maxillary palpi minute, also 3-jointed, the basal joint the shortest, the 2nd longer, its apex thickened; antennæ long, filiform, 13-jointed in the male. Thorax oblong, subcylindrical, the pronotum laterally reaching up to the base of the wings; scutellum quadrate, postscutellum transverse; median segment rounded, bearing an impression on either side; wings of moderate size, stigma large, radial cell appendiculated; three cubital cells, 2nd subtriangular, receiving the 1st recurrent nervure, 3rd subquadrate, receiving the 2nd recurrent nervure;

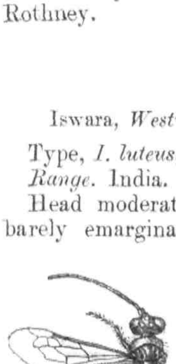


Fig. 8.
Iswara luteus, ♂. $\frac{3}{2}$.

legs moderately long and stout. Abdomen oval, the 2nd segment bearing a semicircular impression on its posterior margin.

Only males are known. The female will probably, when found, prove to be apterous.

Key to the Species.

a. Abdomen yellow, with ferruginous transverse bands	*luteus*, p. 55.
b. Abdomen black, with white transverse bands	*fasciatus*, p. 55.

125. **Iswara luteus**, *Westw. Trans. Ent. Soc.* 1850, p. 233, ♂, pl. vii, figs. 5 & 5 *a*–5 *f*; *Smith, Cat.* vii, p. 65.

♂. Head, thorax, and abdomen shining, with sparse, scattered, fine, shallow punctures, confined on the abdomen chiefly to the bases of the segments; head nearly as wide as thorax, subglobular, the cheeks not much developed; eyes remarkably large; clypeus convex, transversely subovate; postscutellum raised, slightly gibbous; median segment roundly truncate posteriorly and pubescent; abdomen long, narrow, depressed above, subcylindrical below. Head black, the base of the mandibles and the antennæ yellow; the thorax, median segment, and abdomen pale yellow; a stripe on each side of the mesonotum and broad transverse bands, widest in the middle, on the posterior margins of the first six segments of the abdomen pale ferruginous; legs whitish yellow; wings lacteous hyaline.

Hab. Sind; Western India. ♂. *Length* 15; *exp.* 26 mm.

*126. **Iswara fasciatus**, *Smith, A. M. N. H.* (4) xii, 1873, p. 253; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 137.

♂. "Black, variegated with yellow and white spots and fasciæ, with the legs entirely pale. Head black, antennæ fulvous; the scape in front, the clypeus, and mandibles yellowish white, the tips of the latter ferruginous; thorax black; the prothorax, a large square spot tridentate at its anterior margin, the tegulæ, scutellum and postscutellum, a large subquadrate macula beneath the wings, and the legs pale yellow; the coxæ and femora at their base above more or less fuscous; wings hyaline, nervures of anterior wing black, those of the posterior fuscous; abdomen black, 1st segment with a white apical fascia, on the other segments it is basal, broad, occupying two-thirds of the segments, and each fascia is narrow in the middle, being angularly incised at the posterior margin; beneath, the fasciæ on the segments are deeply incised and become oblong divergent maculæ."

Hab. Sind (*Smith*). ♂. *Length* 6 lines=about 13 mm.

Family SCOLIIDÆ.

Fossorial Wasps of varying size, none minute, some very large; bodies heavy, massive in the female, more slender in the male; mandibles strongly arched, large in proportion, and often considerably wider about the middle than at the base; antennæ in female short, cornute, or arched, in male longer, filiform; eyes either emarginate or simple; ocelli always present, in a triangle on the vertex. Thorax of moderate length, the posterior angles of the pronotum prolonged back to the base of the wings; median segment equal to or shorter than the mesonotum, rounded, truncate, sometimes emarginate posteriorly; legs short, stout, and (except in the males of *Tiphia* and *Myzine*) more or less densely clothed above with stiff hairs and spines; intermediate coxæ widely separated; intermediate tibiæ with one apical spur*; the apex of the posterior legs generally not reaching up to the apex of the abdomen; wings broad and ample, the neuration in certain genera stopping at a considerable distance from the apical margin of the wing; fore wing with one radial, and at least two cubital cells, the 1st discoidal cell not particularly lengthened, always shorter than the medial cell. Abdomen generally massive and long, the 1st ventral segment always separated from the 2nd by a deep constriction or furrow; the apex in the male furnished with one or more spines.

Key to the Genera.

A. Inner orbits of the eyes not emarginate †.
 a. Fore wing with two cubital cells .... TIPHIA, p. 56.
 b. Fore wing with three cubital cells .... MYZINE, p. 64.
B. Inner orbits of the eyes emarginate.
 a. Fore wing with only one recurrent nervure .... SCOLIA, p. 71.
 b. Fore wing with two recurrent nervures.
  a'. The recurrent nervures received separately in the 2nd cubital cell.................... .... ELIS, p. 89.
  b'. The recurrent nervures uniting and received in the 2nd cubital cell as one .... LIACOS, p. 101.

Genus TIPHIA.

Tiphia pt., *Fabr. Ent. Syst.* ii, p. 223 (1793).
Bethylus, pt., *Panz. Krit. Revis. Faun. Deutschl.* ii, p. 133 (1806).

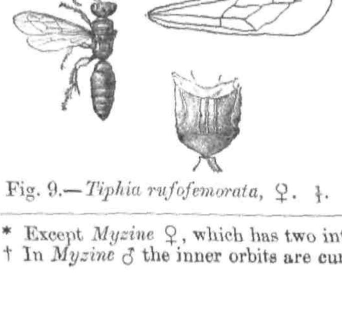


Fig. 9.—*Tiphia rufofemorata*, ♀. ⅟.

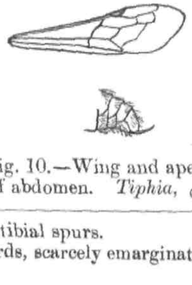


Fig. 10.—Wing and apex of abdomen. *Tiphia*, ♂.

* Except *Myzine* ♀, which has two intermediate tibial spurs.
† In *Myzine* ♂ the inner orbits are curved outwards, scarcely emarginate.

Type, *T. femorata*, Fabr.

Range. Both hemispheres.

Head as wide as the thorax; pronotum transverse anteriorly; median segment truncate posteriorly; sides of thorax excavated; fore wing with the radial cell open at apex in ♀, closed in the ♂, two cubital cells each receiving a recurrent nervure; abdomen elongate oval; basal segment narrower than the 2nd, more or less constricted at the apex; anal segment in ♂ furnished with a recurved spine.

Key to the Species.

A. Wings distinctly fuscous. Legs black.
- *a.* Intermediate and posterior femora red . *T. rufo-femorata*, p. 58.
- *b.* Intermediate and posterior femora black.
  - *a'.* Pronotum smooth or with a very few scattered punctures; both wings dark fuscous, hyaline at base. ♀ length 16–18 mm. ...... *T. fumipennis*, p. 58.
  - *b'.* Pronotum anteriorly closely punctured; fore wing darker than hind wing, paler along apical margin. ♀ length 13 mm. .... *T. compressa*, p. 59.

B Wings hyaline or flavo- or fusco-hyaline.
- *a.* Legs entirely black.
  - *a'.* Intermediate and posterior femora red; abdomen black .... *T. cassiope*, p. 59.
  - *b'.* Intermediate and posterior femora black.
    - *a²*. Median segment with five longitudinal carinæ.
      - *a³*. Carinæ parallel; posterior margin of basal abdominal segment punctured.................. *T. flavipennis*, p. 59.
      - *b³*. Outer two carinæ on each side converging posteriorly; posterior margin of basal abdominal segment shortly longitudinally striolate.................... *T. lyrata*, p. 60.
    - *b²*. Median segment with three longitudinal carinæ.
      - *a³*. Median segment rugose.
        - *a⁴*. Clypeus incised at apex .... *T. incisa*, p. 60.
        - *b⁴*. Clypeus produced at apex, the sides widely emarginate .... *T. implicata*, p. 61.
      - *b³*. Median segment smooth or only slightly punctured.
        - *a⁴*. Basal and greater part of 2nd abdominal segment impunctate .... *T. consueta*, p. 61.
        - *b⁴*. Basal and 2nd abdominal segments more or less closely punctured............... *T. intrudens*, p. 61.

b. Legs red or ferruginous.	
a'. Median segment with three longitudinal carinæ.	
a^2. Abdomen black	*T. rufipes*, p. 61.
b^2. Abdomen black, variegated with yellowish white	*T. vicina*, p. 62.
b'. Median segment with five longitudinal carinæ	*T. policarinata*, p. 62.
c. Legs black, all the tibiæ and tarsi more or less testaceous.	
a'. Median segment with five longitudinal carinæ	*T. flavipennis* ♂, p. 59.
b'. Median segment with three longitudinal carinæ.	
a^2. Antennæ reddish	*T. erythrocera*, p. 63.
b^2. Antennæ distinctly black.	
a^3. Third and succeeding abdominal segments with conspicuous fulvous pubescence	*T. fuscinervis*, p. 63.
b^3. Third and succeeding abdominal segments covered with short soft scattered white hairs	*T. hirsuta*, p. 63.
C. Wings golden yellow, hind wing much paler, in striking contrast with fore wing.	*T. auripennis*, p. 64.

127. **Tiphia rufo-femorata,** *Smith, Cat.* iii, p. 83, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 115.

♀. Head, thorax in front, and abdomen with fine scattered punctures; median segment smooth above, subquadrate, nearly flat, the sides obliquely and the apex vertically truncate, the verge of the truncation strongly reflexed; from the base of the segment three central longitudinal carinæ run to the verge of the truncation, the space between them and on either side smooth and shining; abdomen with the basal segment campanulate, constricted along the apical margin. Black, the mandibles darkish red, the intermediate and posterior femora bright red; wings fusco-hyaline, nervures piceous, tegulæ black.

Hab. India; Burma; Tenasserim; Ceylon. ♀. *Length* 12; *exp.* 23 mm.

128. **Tiphia fumipennis,** *Smith, Jour. Linn. Soc.* 1858, p. 90; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 116.

♀. Head, pronotum in front, mesonotum, scutellum, and postscutellum coarsely punctured; median segment smooth above, subquadrate, obliquely truncate at the sides and vertically at the apex: from the base of the segment run three central longitudinal carinæ to the verge of the truncation, which is strongly reflexed, the space between them and the space on both sides smooth and shining, but the carinæ themselves are each of them bordered on both sides by a row of very fine punctures; abdomen smooth, the basal segment polished, impunctate except for a subapical row of fine punctures, the remaining segments sparingly punctured, the punctures fine and denser on the apical segments. Black, a thin

griseous pubescence on the head, thorax in front, and apical half of the abdomen; the extreme apex of the anal segment ferruginous.

Hab. Tenasserim; Borneo. ♀. *Length* 16–18; *exp.* 24–28 mm.

129. **Tiphia compressa,** *Smith, Cat.* iii, p. 82, ♀; *Cam. Mem. Manch L. Ph. Soc.* (4) v, 1892, p. 115.

♀. Head, pronotum in front, sides of the median segment, legs, and abdomen thinly pubescent; the head, pro- and mesonotum closely and rather coarsely punctured; abdomen above and below finely punctured; on the basal two segments the punctures are somewhat sparser and finer; median segment above convex subquadrate, the sides obliquely and the apex vertically truncate, the sides longitudinally striate; the truncation at apex smooth and shining, slightly concave above; the median segment has three central, longitudinal, parallel carinæ, running from the base to the transverse carina on the verge of the truncation at apex, the space between the carinæ very slightly rugose; abdomen with the basal segment campanulate, slightly constricted at the apical margin. Black and shining; the pubescence whitish; the intermediate and posterior femora beneath castaneous; wings—fore wing fusco-hyaline, clearer at base; hind wing hyaline; nervures testaceous, tegulæ black.

♂ similar.

Hab. Sikhim; Burma; Tenasserim; China; Philippines. ♀. *Length* 13; *exp.* 24 mm. ♂ slightly smaller.

130. **Tiphia cassiope,** *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♀. Closely resembles *T. rufo-femorata,* Smith, but is very much smaller, the head is more globular, and, as well as the pronotum, not so coarsely punctured; the median segment is comparatively longer and narrower towards the apex, which is more obliquely truncate; the three median carinæ are not so well-marked and raised, and the central one does not nearly reach the verge of the truncation; the abdomen is much more sparsely and finely punctured, and the wings are hyaline, not fuscous. Like *T. rufo-femorata*, *T. cassiope* has the intermediate and posterior femora red.

Hab. Mussooree. ♀. *Length* 7; *exp.* 13 mm. Type in coll. Rothney.

131. **Tiphia flavipennis,** *Smith, Jour. Linn. Soc.* 1858, p. 91, ♀.

♀. Head, pronotum anteriorly, mesonotum in the middle, and the 2nd and succeeding segments of the abdomen finely punctured; the posterior margin of the pronotum, the sides of the mesonotum, and the basal segment of the abdomen impunctate; the scutellum and postscutellum with a few scattered punctures; the whole insect polished and shining; the clypeus with two blunt projecting teeth at the apex; median segment with the usual three central longitudinal carinæ from the base of the segment to the

verge of the truncated apex, and two abbreviated carinæ in the intermediate spaces. Black, with a thin short hoary pubescence on the clypeus, legs, and posterior portion of the abdomen; mandibles broadly reddish in the middle; antennæ slightly fulvous beneath; wings hyaline; the fore wing with a flavo-fuscous tint; nervures and tegulæ along the outer margins testaceous.

♂ (*T. clypealis*, Cam. MS.). Similar, but smaller, more pubescent; the apical margin of the clypeus curved, rufescent; the apex of the antennæ also rufescent; the fore tibiæ and tarsi testaceous; the median segment with the five longitudinal carinæ as in the ♀; the basal segment of the abdomen with a subapical row of punctures, and the remaining segments more closely punctured.

Hab. Mussooree; Tenasserim; Borneo. ♀. *Length* 10–11; *exp.* 16 mm. ♂. *Length* 7; *exp.* 12 mm.

132. **Tiphia lyrata,** *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 252, ♀.

♀. Head and the basal half of the pronotum coarsely but somewhat sparsely, and the middle of the mesonotum in front of the scutellum rather more closely punctured; sides smooth and shining; scutellum smooth, its posterior margin with a few punctures; postscutellum smooth and shining; median segment opaque, furnished with five carinæ above, forming a mark shaped something like the Greek lyra; the median carina straight, unbroken, the two lateral arched and converging, truncated a little past the middle of the area, the two external also arched and converging and produced to the apex of the segment, the included space, as well as the surface of the segment outside, opaque and lightly rugulose; the basal segment of the abdomen smooth, beautifully polished, its extreme apical margin emarginate, and shortly but obsoletely longitudinally striate; the remaining segments less shining, minutely punctured, chiefly in the middle of the apical margin. Black and shining, with silvery pubescence; the mandibles and the anal segment of the abdomen above rufo-ferruginous; the apices of the femora and the tegulæ of the wings fusco-ferreginous; the posterior margin of the pronotum flavo-testaceous; wings flavo-hyaline; nervures testaceous.

Hab. Karen Hills, Burma. ♀. *Length* 7–8; *exp.* 12 mm.

133. **Tiphia incisa,** *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♂. Head, thorax, and abdomen pubescent, finely and closely punctured; clypeus anteriorly fringed with long hairs, incised in the middle; median segment finely rugulose, obliquely truncate at apex, with the usual three central longitudinal carinæ; abdomen with the posterior margins of the segments fimbriated, and the apical three or four segments studded with short fine hairs. Black, the pubescence cinereous; wings hyaline; nervures and stigma dark testaceous brown; tegulæ black.

Hab. Mussooree. ♂. *Length* 10; *exp.* 18 mm. Type in coll. Rothney.

134. **Tiphia implicata,** *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♂. Head, pronotum, mesonotum, scutellum, and postscutellum closely and finely punctured; median segment somewhat coarsely reticulate, obliquely truncate at apex, the space between the usual three median longitudinal carinæ transversely striate; abdomen with the middle of the segments above finely punctured; the head, thorax in front, the median segment laterally, and the abdomen covered with a thin short pubescence; the clypeus anteriorly broadly produced in the middle, the sides widely emarginate. Black, the pubescence cinereous; wings hyaline, fuscescent towards the apex; nervures and stigma dark testaceous brown; tegulæ black.

Hab. Mussooree. ♂. *Length* 9; *exp.* 17 mm. Type in coll. Rothney.

135. **Tiphia consueta,** *Smith, New Sp. Hym. B. M.* p. 184, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 116.
Methoca nigra*, *Bingh. P. Z. S.* 1896, p. 427, ♀.

♀. Head, pronotum in front, and the 2nd and following segments of the abdomen with a thin scanty pubescence; head, pronotum in front, mesonotum, scutellum, and postscutellum closely punctured; median segment smooth and shining, the sides obliquely and the apex vertically truncate, three central, longitudinal, parallel carinæ running from the base to the verge of the truncation, the space between them very minutely punctured; abdomen shining, the basal segment and great part of the basal portion of the 2nd segment impunctate, the apical margin of the latter and succeeding segments with transverse bands of rather sparse and fine punctures; the basal segment at apex not much constricted. Black; the wings hyaline, fuscescent on the apical half of both fore and hind wing.

Hab. Ceylon. ♀. *Length* 9; *exp.* 16 mm.

136. **Tiphia intrudens,** *Smith, Jour. Linn. Soc.* 1863, p. 25, ♀ ♂.

♀. Resembles *T. compressa*, Smith; differs in being smaller and more slender; in having the posterior margins of the pronotum and of the segments of the abdomen narrowly testaceous; the apex of the abdomen, nervures and tegulæ of the wings testaceous instead of black; and in the thorax and abdomen being much more sparingly punctured.

Hab. Bengal; Mysol. This species will probably also be found in Burma, Tenasserim, and the whole Indo-Malayan subregion. ♀. *Length* 11; *exp.* 20 mm. ♂ slightly smaller.

137. **Tiphia rufipes,** *Smith, Cat.* iii, p. 83, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 115.

♀. Head, pronotum in front, mesonotum, scutellum, and

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* By mistake identified as a *Methoca*.

postscutellum closely punctured; median segment smooth and somewhat shining, subconvex above, the sides obliquely and the extreme apex vertically truncate; three central longitudinal carinæ running from base to the verge of the truncation, the space between them and on either side very smooth and highly polished; abdomen sparsely punctured all over, the punctures fine and more dense towards the apex. Black; the mandibles, antennæ, and the femora, tibiæ, and tarsi of all the legs testaceous red; the head, thorax, and abdomen with a thin and scanty whitish pubescence; wings hyaline, very slightly fuscescent on the apical half, nervures and tegulæ testaceous.

Hab. Northern India; Burma. ♀. *Length* 7; *exp.* 13 mm.

138. **Tiphia vicina**, *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 251, ♀.

♀. Head and thorax sparsely punctured, the disc of the mesonotum cribrate; median segment above smooth, shining, furnished with three posteriorly convergent, impressed, median longitudinal lines; the metapleuræ posteriorly rugosely opaque, closely striate; abdomen—the basal segment shining, its posterior margin with a subapical row, broadening at the sides, of coarse punctures, the 2nd smooth, the semaining segments moderately rugosely punctured; clypeus, scape of the antennæ beneath, and the apical margins of the abdominal segments pilose, the intermediate and posterior tibiæ covered with rigid hairs over silky pile. Black, shining, the palpi and the intermediate and posterior femora pale rufo-ferruginous; the mandibles, flagellum of the antennæ beneath, tegulæ, anterior legs, intermediate and posterior tibiæ and tarsi, and the anal segment of the abdomen above obscurely ferruginous red; a yellowish-white narrow transverse band subapically on the basal abdominal segment above, and at the base of the 2nd and 3rd segments above and below; pubescence white, the silky pile on the intermediate and posterior tibiæ silvery; wings hyaline, nervures subfuscous.

Hab. Bhamo, Upper Burma. ♀. *Length* 9 mm.

139. **Tiphia policarinata**, *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 250, ♀.

♀. Head, pronotum, scutellum, postscutellum, and abdomen above sparsely and lightly punctured; the posterior margin of the pronotum broadly smooth; mesonotum cribrate, a few shining distinct patches on the sides; median segment smooth, subopaque, furnished with five (sometimes, owing to the lateral grooves, becoming many) parallel carinæ. Black, shining; the mandibles, antennæ (the scape often excepted), the tegulæ, legs (except the coxæ), and the apical abdominal segment above broadly ferruginous red; wings yellowish, nervures testaceous.

Hab. Karen Hills, Burma. ♀. *Length* 5½–7 mm.

140. **Tiphia erythrocera,** *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♀. Head, pronotum in front, and mesonotum closely punctured, the posterior margin of the pronotum, the scutellum and post-scutellum smooth; the median segment smooth, with a few scattered punctures, obliquely truncate at apex; the usual three central longitudinal carinæ, the middle one abbreviated, not half the length of the outer two; abdomen finely punctured; the whole head, thorax in front and on the sides, and abdomen covered with a thin pubescence. Black, the mandibles and antennæ dark red; the tibiæ and tarsi of the legs testaceous brown or castaneous; pubescence on the head in front and on the tibiæ and tarsi fulvous-golden, on the abdomen cinereous; wings hyaline; nervures, stigma, and tegulæ pale testaceous.

Hab. Mussooree. ♀. *Length* 8; *exp.* 15 mm.

141. **Tiphia fuscinervis,** *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♂. Head, pro- and mesonotum rugosely punctate; median segment and the 2nd and following segments of the abdomen more finely punctured; median segment comparatively long and narrow, the central carinæ not so conspicuous as in other species, the space between them finely rugose; basal and 2nd segments of the abdomen shining, the punctures on the basal segment coarser than on the rest of the abdomen, the apical five segments densely pubescent. Black, with a thin whitish pubescence on the head and thorax; the pubescence on the apical five segments fulvous; the antennæ obscurely reddish beneath; the apex of the tibiæ and the tarsi of the legs dark testaceous; wings hyaline, with the nervures pale testaceous, the tegulæ black.

Hab. Mussooree. ♂. *Length* 8; *exp.* 17 mm.

142. **Tiphia hirsuta,** *Smith, Cat.* iii, p. 83, ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 115.

♂. Head, the pronotum in front, the sides of the median segment, and the abdomen pubescent; the vertex of the head and the mesonotum in front with rather coarse punctures; the clypeus, front of the face, pronotum, apex of the mesonotum, scutellum, postscutellum, and the 2nd and following segments of the abdomen finely punctured; the basal segment of the abdomen, and the basal margins broadly of the 2nd and 3rd segments smooth and impunctate; the median segment above convex, the sides sharply and obliquely sloping inwards, finely longitudinally striate, the apex vertically truncate, the margin of the truncation above and at the sides with a raised carina; also above, from the base of the median segment, three central longitudinal subparallel carinæ run to the verge of the truncation, the space between the carinæ obscurely transversely striate; abdomen with the basal segment strongly constricted at its posterior margin. Black, the pubescence

short and whitish in colour, the anterior and intermediate tibiæ and tarsi testaceous; wings hyaline, fore wing slightly fuscescent on the apical half; nervures and tegulæ testaceous.

Hab. North India; Bengal. ♂. *Length* 10; *exp.* 17 mm.

143. **Tiphia auripennis**, n. sp.

♀. Head in front, above the base of the antennæ, pronotum anteriorly, mesonotum, scutellum, and postscutellum coarsely punctured; median segment large, subquadrate, slightly convex above, concavo-truncate posteriorly, with the usual three central longitudinal carinæ, the middle one not reaching the transverse carina on the verge of the truncation; abdomen with the basal and 2nd segments coarsely punctured at base and on the sides; 3rd, 4th, and 5th segments above with a broad subapical band of finer punctures, apical segment densely punctured and studded with stiff hairs. Jet-black and shining, with thin long whitish pubescence, tinged with ferruginous on the apical segment; wings hyaline, with a rich golden-yellow tinge, the hind wings lighter than the fore wings.

Hab. Sylhet, Assam. ♀. *Length* 16; *exp.* 26 mm.

Genus MYZINE.

Scolia, pt., *Fabr. Ent. Syst.* ii, p. 236 (1793).
Tiphia, pt., *Fabr. Ent. Syst.* ii, p. 225 (1793).
Elis, pt., *Fabr. Syst. Piez.* p. 248 (1804).
Myzine, *Latr. Hist. Nat. Ins.* xiii, p. 269 (1805).
Sapyga, pt., *Panz. Krit. Revis. Faun. Deutschl.* p. 87 (1806).
Plesia, *Jurine, Hym.* p. 150 (1807).

Fig. 11.
Myzine dimidiaticornis, ♂. $\frac{1}{1}$.

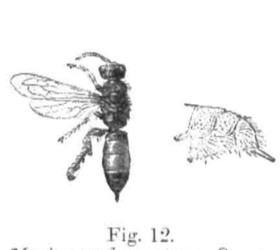

Fig. 12.
Myzine madraspatana, ♀. $\frac{1}{1}$.

Type, *M. sexfasciata*, Rossi.

Range. Both hemispheres.

Characters those of the family. Fore wing with one radial and three cubital cells always present; the radial cell always closed, never open as in *Tiphia* ♀. The neuration of the fore wing in ♂ and ♀ very different. Eyes in ♂ subemarginate within; intermediate tibiæ in ♀ with two apical spurs. Apex of abdomen in ♂ with a strong recurved spine.

Key to the Species.

A. Females only known.
- *a.* Wings fuscous.
  - *a'*. Black; 2nd, 3rd, and base of the 4th abdominal segment red; hind wing hyaline at base .... *M. madraspatana*, p. 65.
  - *b'*. Black; 1–5 abdominal segments red; both wings hyaline at base ...... *M. mandalensis*, p. 66.
  - *c'*. Black; abdomen black, head red.... *M. tricolor*, p. 66.
  - *d'*. Black; wings wholly dark fuscous.. *M. fuscipennis*, p. 67.
- *b.* Wings hyaline or subhyaline.
  - *a'*. Abdomen entirely red .... *M. combusta*, p. 67.
  - *b'*. Abdomen entirely black.
    - *a*². Mandibles and antennæ black; 2nd segment with a transverse impressed line at base .... *M. anthracina*, p. 67.
    - *b*². Mandibles and the flagellum of the antennæ dull red; 2nd segment without an impressed line. *M. claripennis*, p. 68.

B. Males only known.
- *a.* Wings fuscous, broadly hyaline at base.
  - *a'*. Clypeus, scape, and basal four joints of the flagellum of the antennæ red .... *M. dimidiaticornis*, p. 68.
  - *b'*. Clypeus and antennæ black........ *M. dimidiata*, p. 68.
- *b.* Wings hyaline.
  - *a'*. Yellow with black markings.
    - *a*². Abdomen with the posterior margins of the 2–6 segments widely and deeply emarginate .. *M. pallida*, p. 69.
    - *b*². Abdomen with posterior margins of segments normal, transverse, not emarginate .... *M. orientalis*, p. 69.
  - *b'*. Black, abdomen immaculate.
    - *a*². Mandibles, flagellum of the antennæ beneath, and the legs obscurely reddish; pronotum longitudinally striate at the sides. *M. læta*, p. 70.
    - *b*². Mandibles, antennæ, and legs black; pronotum not striate at the sides .... *M. burmanica*, p. 70.
  - *c'*. Black; abdomen with bi-emarginate, narrow transverse yellow bands on the apical margins of the 2–6 segments .... *M. petiolata*, p. 70.

144. **Myzine madraspatana**, *Smith, Cat.* iii, p. 72, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 114.

♀. Head, pro- and mesonotum, and scutellum rugose, roughly and coarsely punctured; the median segment anteriorly and down the middle and the postscutellum smooth and shining, the former truncate posteriorly, with an abbreviated longitudinally impressed line, enclosed by parallel carinæ, at its base; abdomen smooth, finely and distantly punctured. Black, the 2nd, 3rd, and base of

the 4th segment of the abdomen dark red; wings dark fuscous, the hind wing hyaline at base.

Hab. Southern India. ♀. *Length* 19; *exp.* 32 mm. Type in the British Museum.

145. **Myzine mandalensis.**

Plesia mandalensis, *Magr. Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 257, ♀.

♀. Head, scape, and basal joint of the flagellum of the antennæ sparsely but somewhat deeply punctured; a large space on the vertex smooth and shining; clypeus subopaque, minutely punctate, rugose, with a median longitudinal carina; pronotum large, wide, elongated into a neck anteriorly, transversely striate, posteriorly somewhat closely punctured, the extreme margin smooth and arched; propleuræ with raised striæ; the disc of the mesonotum smooth, the median area broad, sparsely punctured and marked off by two oblique impressed lines, the lateral portions also smooth and marked off by two other impressed lines; scutellum trapeziform, shining and sparsely punctured; postscutellum narrow, smooth and shining; mesopleuræ lightly punctured; median segment opaque, minutely or obsoletely rugose and reticulate, a central longitudinal groove from base, with a carina along the middle of the groove, the sides of the segment with dense silky grey pile; the legs with silvery pile, the intermediate and posterior tibiæ having a mixture of short and long spoon-shaped hairs chiefly on the outside; the calcaria with silvery pubescence; abdominal segments shining, sparsely punctured. Head, thorax, and legs black; abdomen obscure rufo-ferruginous, the anal segment fuscous; anterior wings at base distinctly hyaline with an admixture of smoky fuscous, having four longitudinal hyaline lines; posterior wings hyaline, the extreme apex somewhat fuscescent; the mandibles and the flagellum of the antennæ at apex fuscous; the palpi and tegulæ of the wings flavo-testaceous.

Hab. Mandalay, Upper Burma. ♀. *Length* 9–10 mm.

146. **Myzine tricolor**, *Smith, Jour. Linn. Soc.* 1858, p. 91, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 115.

♀. Head between the base of the antennæ and the posterior ocelli, pronotum, mesonotum except a narrow margin anteriorly, scutellum, and postscutellum with coarse shallow punctures; median segment convex above, obliquely truncate posteriorly, at base finely and distantly and towards the apex more coarsely and densely punctured, the punctures most dense on the face of the truncation; a central shallow longitudinal groove at base above, cribrate at bottom, narrowing from base to apex, which does not reach the verge of the truncation; abdomen smooth, with scattered punctures, the basal segment at base vertically truncate, the face of the truncation smooth. Black, the head deep red, the apical 7 or 8 joints of the flagellum of the

antennæ fuscous; abdomen with blue and violet tints; wings fuscous, hyaline at base, nervures dark testaceous brown, tegulæ black.

Hab. Assam; Borneo. ♀. *Length* 19–21; *exp.* 28 mm.

147. **Myzine fuscipennis**, *Smith, Cat.* iii, p. 72, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 114.

♀. Head with a few widely spaced coarse punctures; pro- and mesonotum, scutellum and postscutellum rather more closely and coarsely punctured; median segment finely transversely rugulose, with an abrupt steep slope at apex, and a central longitudinal short groove at base above, the groove bounded on each side by a fine shining carina; legs and abdomen thinly pubescent, the base of the 1st segment of the latter coarsely punctured, the remaining segments with a few fine scattered punctures. Black and shining, the pubescence whitish, the flagellum of the antennæ opaque alutaceous; wings fuscous brown, nervures and tegulæ testaceous.

Hab. India; Burma; Tenasserim. ♀. *Length* 11–14; *exp.* 18–20 mm.

148. **Myzine combusta**, *Smith, New Sp. Hym. B. M.* p. 179, ♀; *Cam Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 113.

♀. Head in front, the anterior lateral angles of the pronotum, the pro- and mesopleuræ closely and coarsely punctured, almost cribrate; the vertex of the head, the pronotum anteriorly in the middle, and its broad posterior margin, the mesonotum, scutellum, postscutellum, and median segment smooth, dull and opaque; the median segment concavo-truncate posteriorly, the verge of the truncation above with two or three coarse transverse grooves, a small raised space at the base coarsely punctured, the metapleuræ obliquely striate; abdomen smooth and shining, segments 3–5 above with a very few scattered punctures, the apical segment coarsely and closely punctured and studded with stiff hairs. Black; the mandibles, the flagellum of the antennæ, the femora, tibiæ, and tarsi of the legs, and the abdomen ferruginous red; the mesonotum with a square mark in the middle orange-yellow, bounded on each side by a broad longitudinal band of ferruginous red, the margins of the abdominal segments shaded with fuscous; wings hyaline, nervures and tegulæ testaceous.

Hab. India. ♀. *Length* 19; *exp.* 30 mm.

149. **Myzine anthracina**, *Smith, Cat.* iii, p. 71, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 113.

♀. The head and thorax with large scattered punctures; median segment finely punctured, with a central smooth shining line at its base; legs and abdomen beneath thinly pubescent; abdomen above shining, the segments finely punctured at their basal margins,

the punctures larger and more scattered posteriorly, the 2nd segment with a transverse impressed line at its apical margin. Black, the pubescence cinereous white, the spines on the legs pale testaceous; wings subhyaline, faintly clouded at their apical margins.

Hab. India. ♀. *Length* 13; *exp.* 23 mm.

150. **Myzine claripennis**, n. sp.

♀. Head, mesonotum, scutellum, postscutellum, median segment, and abdomen smooth and shining, with only a few scattered punctures and some stiff sparsely placed hairs on the scape of the antennæ beneath, on the back of the head, and on the sides and ventral segments of the abdomen; legs somewhat more densely pubescent; pronotum, especially at base, rather closely punctured; median segment at base with a short, subtriangular, central, longitudinal impression. Jet-black, the pubescence glistening white, mandibles and the flagellum of the antennæ beneath dull red: wings hyaline, lightly infuscated towards the apex.

Var. Head and abdomen slightly more closely and finely punctured; tibiæ and tarsi piceous; wings somewhat more fuscescent.

Hab. Burma; Tenasserim. ♀. *Length* 9–11; *exp.* 16–18 mm. Type in the British Museum.

151. **Myzine dimidiaticornis**, *Bingh. Jour. Linn. Soc., Zool.* xxv, 1896, p. 423, ♂.

♂. Head, thorax, and basal segment of the abdomen coarsely punctured, the rest of the abdominal segments smooth and shining, with a few scattered punctures; antennæ short and thick; pronotum long, truncate anteriorly; median segment subcylindrical, truncate posteriorly, with a central longitudinal well-marked carina, meeting a short transverse one at the margin of the truncation; abdomen long, subcylindrical, the segments strongly contracted at their bases, the apical recurved spine large. Black, the abdomen with brilliant blue and purple reflections, the mandibles, clypeus, scape, and basal four joints of the flagellum of the antennæ and the frontal tubercles above the base of the scape dark red; wings hyaline for their basal half, dark fuscous with a purple effulgence beyond.

Hab. Kumaun, North India. ♂. *Length* 14 mm.; *exp.* 24 mm.

152. **Myzine dimidiata**, *Guér. Dict. pitt. d'Hist. Nat.* v, p. 575, ♂; *Smith, Cat.* iii, p. 71; *Cam. Mem. Manch. L.Ph. Soc.* (4) v, 1892, p. 113.

Myzine nitida, *Cam.* (*nec Smith*) *t. c.* p. 114.

♂. Head, thorax, and abdomen thinly pubescent, the pubescence on the clypeus longer and thicker than on the rest of the head and body; front above the base of the antennæ and up to the ocelli very

closely and coarsely punctured; vertex and the region of the ocelli impunctate; pronotum in front, mesonotum, scutellum and post-scutellum closely punctured, the posterior margin of the pronotum smooth; the mesonotum with a deeply marked **V**-shaped groove; median segment rugose, rounded posteriorly; abdomen smooth, shining, with only a few very fine punctures above. Jet-black, the abdomen with blue and violet tints; the mandibles at base, the apex of the clypeus, the fore tibiæ in front, and the fore tarsi pale yellow; wings hyaline for about a third of their length from base, beyond fuscous suffused with blue and violet.

Hab. Bombay; Bengal. ♂. *Length* 15; *exp.* 24 mm.

153. **Myzine pallida**, *Smith, New Sp. Hym. B. M.* p. 179; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 115.

♂. Head shining, with a few scattered punctures; thorax and abdomen smooth, opaque; median segment short, posteriorly obliquely truncate, an obscure short central longitudinal groove at base; abodmen long, longer than the head and thorax together, segments 2–6 above with their posterior margins widely and deeply emarginate. Pale whitish yellow, the head black; the mandibles, clypeus, and scape of the antennæ whitish yellow; the flagellum of the antennæ, a stripe over the tegulæ, and broad transverse bands at the base of the abdominal segments above dark testaceous brown; wings hyaline and iridescent, nervures testaceous brown, tegulæ yellow.

Hab. North-West Provinces, India. ♂. *Length* 7–9; *exp.* 13 mm.

154. **Myzine orientalis**, *Smith, New Sp. Hym. B. M.* p. 179, ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 115.

♂. Head, thorax, and abdomen punctured, the punctures light and inconspicuous. Head in front, the median segment posteriorly, and the base of the 1st abdominal segment with long hairs; clypeus with its anterior margin arched, much broader than high, the sides turned up; antennæ very long and filiform; median segment short, concavo-truncate posteriorly; abdomen tapering gradually to the apex from the 2nd segment; basal segment slightly constricted along the apical margin. Variegated with pale yellow and black; the mandibles, clypeus, scape, pronotum in front, postscutellum, the femora, tibiæ, and tarsi of the legs, and broad median transverse bands on segments 1–6 of the abdomen pale whitish yellow; the mesonotum with a large square macula at apex, and the centre of the scutellum orange-yellow, the rest of the parts black; wings hyaline and iridescent, faintly yellowish at the apex of the fore wing, nervures dark testaceous, tegulæ yellow.

Hab. Baluchistan. ♂. *Length* 12; *exp.* 22 mm. Type in the British Museum.

155. **Myzine læta,** n. sp.

♂. Head—the clypeus with long soft hairs, the front above the antennæ closely punctured, the punctures on the vertex and about the ocelli fewer and more widely spaced; the pronotum punctured in the middle, longitudinally striate at the sides; mesonotum, scutellum, postscutellum, median segment, and abdomen sparsely punctured, the basal three segments of the last almost smooth and shining above, the basal segment itself petiolate, swollen towards the apex, which is strongly constricted. Black, the pubescence on the clypeus white; the mandibles, flagellum of the antennæ beneath, the coxæ, trochanters, femora, tibiæ, and tarsi obscurely reddish; wings hyaline and iridescent, nervures and tegulæ testaceous.

Hab. Moulmein, Tenasserim. ♂. *Length* 11; *exp.* 16 mm.

156. **Myzine burmanica,** n. sp.

♂. Closely resembles *M. læta*, but the head is more closely, evenly, and coarsely punctured, the pronotum is punctured not striate at the sides, the punctures on the mesonotum and median segment are finer and closer, on the latter running into obscure transverse striæ; the antennæ and legs are distinctly black, not dull reddish, and the wings are more or less fuscescent on the disc and towards the apex.

Hab. Burma; Tenasserim. ♂. *Length* 10; *exp.* 18 mm. Type in the British Museum.

157. **Myzine petiolata,** *Smith, Cat.* iii, p. 72, ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 115.

♂. Head above the antennæ rather closely and coarsely, and the vertex, pronotum, mesonotum, scutellum, and postscutellum more finely punctured; median segment rounded posteriorly, finely rugulose, with an abbreviated central longitudinal groove near the base; abdomen petiolate, the apical half of the basal segment globose, the base of the 2nd segment strongly, the bases of the rest lightly constricted; the whole abdomen, but especially the basal segment above, smooth and shining. Black; the base of the mandibles, the clypeus, the apex of a semicircular projection above the base of the antennæ, the posterior margin of the pronotum, the anterior tibiæ and tarsi, the base and apex of the intermediate and posterior tibiæ and tarsi, and bi-emarginate narrow transverse bands on segments 2–6 of the abdomen posteriorly, yellow; wings hyaline and iridescent, nervures and tegulæ testaceous.

Hab. Barrackpore, Bengal. ♂. *Length* 12; *exp.* 17 mm.

Genus SCOLIA.

Scolia, *Fabr. Syst. Ent.* p. 355 (1775).
Tiphia, pt., *Fabr. Ent. Syst.* ii, p. 223 (1793).
Scolia, pt., *Smith, Cat.* iii, p. 85 (1855).
Scolia (subgen. Triscolia and Discolia), *Sauss. & Sich. Cat. Scol.* p. 14 (1864).

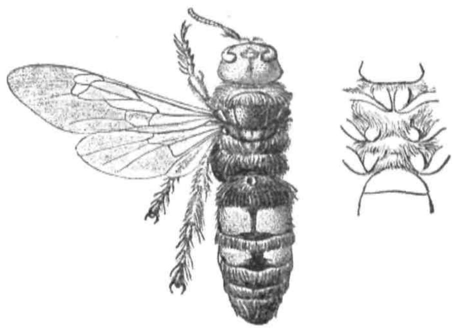

Fig. 13.—*Scolia (Triscolia) hæmorrhoidalis*, ♀. ½.

Type, *S. flavifrons*, Fabr.
Range. Both hemispheres.

Characters those of the family *. Fore wing with one radial and three (subgenus *Triscolia = Scolia* vera) or two (subgenus *Discolia*) cubital cells and *one recurrent nervure.*

Key to the Species.

A. Fore wing with three cubital cells.
  a. Head, thorax, and abdomen entirely black, without yellow or red markings; wings dark fuscous.
    a'. Vertex of head and disc of mesonotum closely punctured .... *S. nudata*, p. 74
    b'. Vertex of head and disc of mesonotum smooth, polished, with only a few scattered punctures.
      a². Basal half of 1st abdominal segment smooth, polished, with very few scattered punctures; wings fuscous with a brilliant green effulgence .... *S. opalina*, p. 75.
      b². Basal half of the 1st abdominal segment coarsely and rather closely punctured; wings fuscous with violet and purple effulgence .... *S. tyrianthina*, p. 75.

* Properly *Scolia, Elis,* and *Liacos* constitute but one genus, with varying wing neuration; but as this is remarkably constant in each of the divisions, it is convenient to regard the differences as generic. For the purpose of distinguishing the three genera, the number and form of the recurrent nervures in the fore wing have been chosen.

b. Head, thorax, or abdomen, or all three, black, variegated with yellow or ferruginous red; wings fuscous.
  a'. Head, thorax, and abdomen all variegated with orange-yellow (♀ ♂). Length 48–54 mm. .... *S. procer*, p. 75.
  b'. Head only orange-red, rest of thorax and abdomen black (♀ ♂). Length 18–21 mm. .... *S. capitata*, p. 76.
  c'. Head (♀) orange-red, (♂) black; 4th and following segments of abdomen more or less ferruginous red with ferruginous pubescence (♀ ♂). Length 28–35 mm. .... *S. rubiginosa*, p. 76.
c. Head, thorax, and abdomen variegated with black, yellow, and ferruginous red; wings deep fulvo-hyaline .... *S. hæmorrhoidalis*, p. 77.

B. Fore wing with 2 cubital cells.
  a. Wings fuscous.
    a'. Antennæ more or less yellow or orange-yellow or red.
      a^2. Head—front and vertex orange-yellow.
        a^3. Antennæ, scape, and flagellum entirely orange-red .... *S. erratica*, p. 77.
        b^3. Antennæ with scape black, flagellum orange-red or yellow; 3rd abdominal segment at base above with a yellow fascia .... *S. elizabethæ* ♀, p. 78.
        c^3. Antennæ with scape and one or two basal joints of flagellum orange-red or yellow, rest of flagellum fuscous black; abdomen without yellow markings .... *S. molesta*, p. 79.
      b^2. Head black.
        a^3. Antennæ orange-red, scape and basal joint of flagellum black; wings with purple effulgence.
          a^4. 3rd segment of abdomen with a lateral yellow spot............ *S. bilunata*, p. 79.
          b^4. Abdomen wholly black........ *S. aureipennis*, p. 79.
        b^3. Antennæ with scape ferruginous red, flagellum bright yellow; wings with a coppery golden effulgence.. *S. obscura*, p. 80.
    b'. Antennæ wholly black.
      a^2. Head with front and vertex more or less marked with yellow.
        a^3. Comparatively large, over 20 mm. long.
          a^4. Wings fuscous with a violet and golden effulgence; median segment closely and profoundly punctured, cribrate .... *S. bhamoensis*, p. 80.
          b^4. Wings dark fuscous with a blue and purple effulgence; median segment less closely punctured, not cribrate........... ..... *S. fulvifrons* ♀, p. 81.

c^4. Wings light fuscous with a rosy effulgence; median segment very sparsely punctured .... *S. nobilis*, p. 81.

b^3. Smaller, under 18 mm. long.

a^4. Vertex and front wholly orange-red or yellow, sides of pronotum above yellow .... *S. humeralis* ♀, p. 81.

b^4. Front below vertex with a cowl-shaped black mark, sides of pronotum above black .... *S. cucullata*, p. 82.

b^2. Head wholly black.

a^3. Head, thorax, and abdomen wholly black.

a^4. Front above base of antennæ and up to posterior ocelli raised.

a^5. Vertex smooth, impunctate.. *S. læviceps*, p. 82.

b^5. Vertex closely punctured .... *S. cyanipennis*, p. 82.

b^4. Front between base of antennæ and ocelli with a subquadrate depression .... *S. carbonaria*, p. 83.

c^4. Front between base of antennæ and ocelli normal, rounded, neither raised nor depressed.

a^5. Median segment posteriorly deeply emarginate .... *S. redtenbacheri*, p. 83.

b^5. Median segment posteriorly truncate, not emarginate .... *S. cærulans*, p. 83.

b^3. Head and thorax black; abdomen black variegated with yellow or ferruginous red.

a^4. 2nd to 5th abdominal segments fringed thickly with ferruginous-red hairs, apical segment ferruginous with ferruginous pubescence .... *S. indica*, p. 84.

b^4. 2nd to 5th abdominal segments, or any of them, with lateral maculæ or transverse bands at the base red .... *S. quadripustulata*, [p. 84.

c^4. The sides of pronotum as well as abdomen variegated with yellow or orange-yellow .... *S. humeralis* ♂, p. 81.

d^4. Only 3rd and 4th abdominal segments variegated with yellow .. *S. fulvifrons* ♂, p. 81.

b. Wings light brownish, or fusco- or flavo-hyaline.

a'. Head, thorax, and abdomen variegated with yellow, sometimes also with ferruginous.

a^2. Vertex and front of the head wholly yellow.

a^3. Thorax and abdomen variegated with black and yellow only; base of 1st abdominal segment tuberculate above; disc of mesonotum smooth, impunctate.................... *S. sikkimensis*, p. 85.

b^3. Thorax and abdomen variegated with black, yellow, and ferruginous; 1st abdominal segment not tuberculate; disc of mesonotum closely punctured .... *S. histrionica*, p. 86.

b^2. Vertex and front of head variegated black and yellow.

a^3. Antennæ orange-red .... *S. elizabethæ* ♂, p. 78.

b^3. Antennæ black.

a^4. Posterior lateral angles of median segment yellow .... *S. desidiosa*, p. 86.

b^4. Posterior lateral angles of median segment deep red .... *S. vivida*, p. 87.

c^4. Posterior lateral angles of median segment black.

a^5. Abdomen—1st segment black, 2nd broadly yellow in the middle above, 3rd with large yellow lateral maculæ, remaining segments black .... *S. venusta*, p. 88.

b^5. Abdomen—2nd segment with yellow lateral maculæ, 3rd segment with a transverse yellow band deeply emarginate above and below, remaining segments black .... *S. kirbyi*, p. 88.

c^2. Head wholly black .... *S. specifica*, p. 89.

b'. The whole head, thorax, and abdomen black .... *S. eliformis*, p. 89.

A. *Fore wing with three cubital cells.*

158. **Scolia nudata,** *Smith, Cat.* iii, p. 110, ♀; *Sauss. & Sich. Cat. Scol.* p. 38, ♀ ♂.

♀. Head and abdomen somewhat sparsely but coarsely punctured; thorax densely punctured; clypeus slightly convex, smooth and shining in the middle, punctured at the sides, its anterior margin rounded, the space round the ocelli on the vertex and behind the eyes smooth and shining; the sides of the postscutellum with oblique divergent striæ, the central portion of the median segment almost cribrate; legs stout, punctured, covered with stiff pubescence and spines; abdomen as wide as the thorax, the basal 4 segments with the puncturing widely spaced in the middle above. Black, the abdomen with purple and blue iridescent shades in certain lights; wings very dark fuscous with a deep purple effulgence; a sparse scattered black pubescence covers the whole insect, and becomes somewhat dense on the apical two segments of the abdomen.

♂ similar, but smaller and slighter; clypeus subtriangular, its anterior margin transverse in the middle, oblique at the sides; the wings lighter fuscous, with hyaline spaces in the 2nd and 3rd cubital, the discoidal, and submedial cells.

Hab. Assam; Burma; Tenasserim. ♀. *Length* 15–19; *exp.* 38 mm. ♂. *Length* 14; *exp.* 29 mm.

159. **Scolia opalina,** *Smith, Jour. Linn. Soc.* 1858, p. 89, ♀ ♂; *Sauss. & Sich. Cat. Scol.* p. 42 ; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 100.
Scolia unimaculata, *Kirby, Trans. Ent. Soc.* 1889, p. 446, ♀.

♀. Strongly punctured and sparsely pubescent; clypeus oval, its posterior margin tuberculate in the middle just below the base of the antennæ, anterior bent downwards and arched; the face in front, the vertex, the middle of the mesonotum, a central space above on the basal three segments of the abdomen, and a space along the middle of the whole of the ventral segments with distinct but sparse and scattered punctures; the pro- and meta-notum, the sides of the thorax and of the abdomen more closely punctured. Black, with splendid prismatic purple and green colours reflected in certain lights; wings dark fuscous brown, with a brilliant green effulgence, the cell enclosed by the recurrent nervure flavo-hyaline.

Hab. Sikhim; Tenasserim; Borneo. ♀. *Length* 40–45; *exp.* 80–87 mm. ♂. *Length* 19; *exp.* 46 mm.

160. **Scolia tyrianthina,** *Kirby, Trans. Ent. Soc.* 1889, p. 446, pl. xv, fig. 2, ♀.

♀. Head and thorax coarsely and somewhat closely punctured; abdomen more sparsely and finely punctured; the vertex above the ocelli, the disc of the mesonotum, and the median portion of the 2nd and 3rd abdominal segments smooth, or with only a few scattered punctures; the punctures on the basal segment of the abdomen anteriorly coarse like those on the thorax; two parallel abbreviated lateral furrows on the disc of the mesonotum. Intense black, with short black pubescence on the back of the head, sides of the thorax and of the abdomen, the last with a brilliant purple effulgence in certain lights; wings very dark fuscous, with a magnificent purple and violet effulgence.

Hab. Andaman Islands; Tenasserim. ♀. *Length* 21; *exp.* 38 mm.

161. **Scolia procer,** *Illig. Mag., Ins.* i, p. 196, ♀ ♂.
Scolia procera, *Lepel. Hym.* iii, p. 519; *Smith, Cat.* iii, p. 111.
Scolia patricialis, *Burm. Abh. Nat. Ges. Halle,* i, pt. 4, p. 19.

♀. Head, thorax, and abdomen smooth and shining, in parts pubescent and punctured; the disc of the clypeus raised in the middle, subconcave on each side, coarsely punctured, its anterior margin rounded; the front, the mesonotum in the centre, and the middle of the abdominal segments, above and below, at their base smooth and shining; the vertex, the prothorax in front, the mesonotum anteriorly, at the sides and at the apex, the scutellum and postscutellum, the median segment, and the apex and sides of the abdominal segments with coarse punctures, dense on some parts; legs densely spined and pubescent with stiff hairs. Black, the front of the face above the antennæ up to the vertex, the shoulders of the pronotum, the scutellum in the middle and a spot on the

postscutellum, a crescentic mark in the middle of the 1st segment of the abdomen, and a large rectangular spot on each side of the 3rd segment at base chrome-yellow; the vertex of the head, the front of the pronotum and of the mesonotum, the sides of the median segment, and the apical margins and sides of the abdominal segments with stiff coarse black pubescence; wings dark fuscous brown, with a splendid purple and green effulgence.

♂ differs in having in addition the clypeus, the vertex, and a broad line behind the eyes yellow. Varieties have the thorax and 1st segment of the abdomen entirely black, or the median segment maculate and the spots at the base of the 3rd segment joined into a stripe, or the posterior margin of the 1st segment with an additional stripe yellowish, and the fringe of hairs fulvous.

Hab. India, Burma, Tenasserim, extending to Sumatra, Borneo, and Java. ♀. *Length* 48–54; *exp.* 94–100 mm. ♂. *Length* 40–48; *exp.* 80–88 mm.

162. **Scolia capitata,** *Guér. Voy. Coq.* ii, pt. 2, p. 248; *Burm. Abh. Nat. Ges. Halle*, i, pt. 4, p. 20; *Sauss. & Sich. Cat. Scol.* p. 47, ♀ ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 102.
Scolia ruficeps, *Smith, Cat.* iii, p. 111.

♀. Head smooth, with a few scattered punctures; thorax closely, abdomen more sparsely punctured; clypeus transversely oval, closely punctured at the sides, a square portion in the middle raised, smooth, the space around the anterior ocellus and a line below the vertex smooth. Black, the head blood-red; the thorax and abdomen with iridescent blue and purple tints in certain lights; wings brown with a golden effulgence.

Fig. 14.—*Scolia capitata*, ♀. 1/1.

♂ similar, but with the wings darker.

Varieties have the anterior legs variegated with yellow or ferruginous, or the front and scape of the antennæ black.

Hab. Kumaun; Sikhim; Calcutta; Burma; Tenasserim to the Philippine Islands. ♀. *Length* 18–21; *exp.* 36–40 mm. ♂. *Length* 12–20; *exp.* 34–37 mm.

163. **Scolia rubiginosa,** *Fabr. Ent. Syst.* ii, p. 230; *Smith, Cat.* iii, p. 111; *Sauss. & Sich. Cat. Scol.* p. 45, ♀ ♂.
Scolia ornata, *Lepel. Hym.* iii, p. 517.

♀. Head except the clypeus, disc of the mesonotum, the scutellum, and the central portion of the first four abdominal segments above smooth and shining; the pronotum, the sides and front of the mesonotum, the median segment, and the sides and apical margins of segments 1–4 of the abdomen coarsely and closely punctured; the legs thickly covered with spines and stiff hairs. Black, the head except the clypeus and mandibles, and segments 3–6 of the abdomen red; the pubescence at the back of the head and

on the black parts black, ferruginous red on the red portions; wings dark fuscous brown, with a brilliant purple effulgence.

The ♂ resembles the ♀, but is more pubescent, more closely and densely punctured, and has the head smaller in proportion and black. Varieties may have any or all of the following parts—the head (♀ and ♂) and the 3rd and apical segments of the abdomen—either partially or totally black, with black pubescence.

Hab. Kumaun; Sikhim; Calcutta; S. India; Assam; Burma; Tenasserim; Siam to Malacca, Borneo, and Java. ♀. *Length* 28–35; *exp.* 44–66 mm. ♂. *Length* 24–27; *exp.* 54–62 mm.

164. **Scolia hæmorrhoidalis**, *Fabr. Mant.* i, p. 280; *Lepel. Hym.* iii, p. 522; *Smith, Cat.* iii, p. 110.
Sphex radula, *Sulz.* (*nec Fabr.*) *Abgek. Gesch. Ins.* p. 192, tab. xxvii, fig. 4, ♂.
Scolia erythrocephala, *Klug, Web. & Mohr, Beitr.* i, p. 23, ♀.
Scolia insignis, *Sauss. Ann. Soc. Ent. Fr.* 1858, p. 197, pl. v, fig. 1, ♀; *Sauss. & Sich. Cat. Scol.* p. 47.

♀. Head, pro- and mesonotum anteriorly, scutellum, and segments 2–4 of the abdomen smooth, with only a few scattered coarse punctures; the apex of the mesonotum, the median segment, and the basal segment of the abdomen closely punctured; the clypeus in the middle vertically and the postscutellum transversely rugose; the median segment short, truncate posteriorly, the apex emarginate; legs densely pubescent and spinose. Variegated with black, yellow, and red, with black and ferruginous pubescence; the clypeus, the antennæ, region of the ocelli, pro- and mesonotum, postscutellum, median segment, legs, and abdomen black; the head above, the base of the antennæ, and the scutellum red; the 2nd and 3rd segments of the abdomen with a large yellow macula on each side at base above; the pubescence on the clypeus around the base of the antennæ, on the pronotum, on the middle of the median segment, and on the 2nd and following segments of the abdomen ferruginous red, that on the sides of the thorax, the legs, and basal segment of the abdomen black, on the legs mixed with some ferruginous hairs: wings deep fulvo-hyaline, broadly but lightly fuscescent along the apical and posterior margins; nervures testaceous brown; tegulæ black.

♂ similar, but with the head, thorax, and abdomen finely and closely punctured all over; the head and scutellum are black, not red, and the ferruginous pubescence extends over the vertex of the head, the mesonotum, and scutellum.

Hab. Southern Europe; Persia; Karáchi; Punjab?; Kashmir. ♀. *Length* 40–45; *exp.* 68–74 mm. ♂. *Length* 25–31; *exp.* 48–56 mm.

B. *Fore wing with two cubital cells.*

165. **Scolia erratica**, *Smith, Cat.* iii, p. 88.
Scolia verticalis, *Burm. Abh. Nat. Ges. Halle*, i, pt. 4, p. 37 (*nec Fabr. Ent. Syst.* ii, p. 234).
Scolia westermanni, *Sauss. Ann. Soc. Ent. Fr.* 1858, p. 212, ♀.

♀. Head smooth, with only a very few scattered punctures; thorax and abdomen coarsely punctured, the punctures on segments 2–5 of the latter rather sparse; clypeus with a central, subtriangular raised portion, above which there is an abbreviated vertical furrow; median segment short, posteriorly truncate, the truncation concave; legs pubescent and spinose; abdomen pseudosessile, about as long as the head and thorax together. Black, the head brick-red, the sides and anterior margin of the clypeus narrowly blackish; wings dark fuscous, with a rich purple effulgence.

♂ similar, but smaller, with porrect thick antennæ, and wanting the raised central subtriangular plane on the clypeus; wings lighter in colour, with less of the purple effulgence.

Hab. Sikhim; Burma; Tenasserim; Sumatra; Java. ♀. *Length* 17–19; *exp.* 30–32 mm. ♂. *Length* 13–15; *exp.* 31–32 mm.

166. **Scolia elizabethæ**, n. sp.

♀. Head smooth; thorax closely and coarsely punctured, the posterior margin of the pronotum narrowly, the median portion of the mesonotum, scutellum, and postscutellum smooth; the median segment more closely punctured than the rest, posteriorly concavo-truncate; the abdomen not so closely punctured, the basal segments shining. Black, the back of the head, the pronotum, sides of the thorax, median segment, legs, and posterior margins of the segments of the abdomen covered with a thin black pubescence; the mandibles fringed beneath with long reddish hairs; the flagellum of the antennæ, the head in front and above the base of the scape, and the basal half of the 3rd segment of the abdomen above deep reddish yellow; wings fuscous, with a brilliant purple effulgence.

Fig. 15.—*Scolia elizabethæ*, ♂. ⅟₁.

♂ similar, but slighter, covered all over with a thin hoary pubescence mixed with some black hairs, and differing in having the flagellum of the antennæ of a deeper fulvous-red, and the clypeus, a transverse mark in front above the base of the antennæ, but not quite up to the anterior ocellus, a narrow line behind the eyes, the anterior lateral angles of the pronotum, and a large spot laterally at the base of the 3rd segment of the abdomen clear straw-yellow; the abdomen has iridescent purple gleams in certain lights, and the wings are light fusco-hyaline, with the costal margin and apex of fore wing broadly fuscous, having a purple effulgence.

Var. ♂. The lateral yellow spots at the base of the 3rd segment of the abdomen obsolete.

Hab. Sikhim above 4000 feet; the higher hill forests in Tenasserim and Karennee. ♀. *Length* 22–25; *exp.* 48–51 mm. ♂. *Length* 19–23; *exp.* 40–45 mm.

167. **Scolia molesta**, *Sauss. & Sich. Cat. Scol.* p. 111, ♀ ♂ ; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 104.

Scolia erratica, *Sauss.* (*nec Smith*) *Ann. Soc. Ent. Fr.* 1858, p. 211, ♀ ; *Stettin. ent. Zeit.* 1859, p. 187, ♀ ♂.

♀. Closely resembles *S. erratica*, Smith ; differs in the mesonotum on the disc bring smooth with only a few scattered punctures, and in having, on the whole, the thorax and abdomen less closely punctured than that species; in colour *S. molesta* has the antennæ with the scape and only one or two of the basal joints of the flagellum red, while in *S. erratica* the antennæ are entirely red.

♂ Differs from the same sex of *S. erratica* in having the thorax less densely punctured, in the abdomen having a brilliant purple effulgence, and the wings being of a lighter colour.

Hab. Tenasserim ; Siam ; Singapore ; Sumatra ; Java ; Borneo. ♀. *Length* 24–27 ; *exp.* 42–44 mm. ♂. *Length* 19–22 ; *exp.* 38–40 mm.

168. **Scolia bilunata**, *Sauss. Ann. Soc. Ent. Fr.* 1858, p. 212 ; *Sauss. & Sich. Cat. Scol.* p. 115, ♂ ; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 105.

Scolia bengalensis, *Cam. t. c.* p. 104, ♀ ♂.

♀. Densely punctured and pubescent : the clypeus in the middle, the vertex, and forehead smooth, with only a few punctures ; the abdomen with finer punctures, beneath the base of the 2nd and following segments smooth ; legs with strong and stiff hairs. Black, the flagellum of the antennæ, except the basal joint, brick-red, the 3rd segment of the abdomen with a large yellow spot on each side, the anterior tarsi obscurely piceous ; wings dark fuscous suffused with violet, paler at the apical and posterior margins.

♂ similar, but has only the apex of the antennæ fulvous, and the 4th not the 3rd segment of the abdomen bimaculated. The ♀ sometimes has lateral spots also on the 4th, and the ♂ on the 5th segment of the abdomen.

Hab. Nepal ; Poona ; Bangalore. ♀. *Length* 18–25 ; *exp.* 32–42 mm. ♂. *Length* 15–19 ; *exp.* 24–28 mm.

169. **Scolia aureipennis,** *Lepel. Hym.* iii, p. 525, ♀ ; *Sauss. & Sich. Cat. Scol.* p. 109, ♀ ♂ ; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 103.

Scolia jurinei, *Sauss. Melan. Hym.* (*Mém. Soc. Phys. H. N. Genève*, xiv) p. 45.

Scolia instabilis, *Smit Ca t* iii, p. 88.

Scolia ruficornis, *Klug, Web. & Mohr, Beitr.* i, p. 25.

♀. Head smooth, with a few distant punctures ; thorax and abdomen more closely punctured, the latter slightly pubescent ; clypeus smooth and shining in the centre, with stiff hairs on each side and round the base of the antennæ ; scutellum, postscutellum, and median segment smooth, with a few coarse scattered punctures ;

abdomen more finely punctured, the sides of the 2nd and 5th segments smooth and without punctures. Black, the flagellum of the antennæ except the basal joint red, the pubescence on the sides of the clypeus and about the base of antennæ ferruginous, the rest black; wings fuscous, with purple, coppery, and green reflections.

♂ similar, more finely punctured and more pubescent, the flagellum of the antennæ fuscous, above fulvous-red; the abdomen with brilliant prismatic tints of purple and blue.

Hab. Sikhim; Malabar; Tenasserim; Java; and the Philippines.
♀. *Length* 29–44; *exp.* 48–54 mm. ♂ a little smaller.

170. **Scolia obscura,** *Lepel. Hym.* iii, p. 527, ♀; *Smith, Cat.* iii, p. 89; *Sauss. & Sich. Cat. Scol.* p. 113; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 104.

♀. Head, thorax, and abdomen very sparsely punctured, the punctures somewhat closer on the pronotum, anterior half of the mesonotum, and on the 4th and 5th abdominal segments above; the vertex of the head, the posterior half of the mesonotum, scutellum, postscutellum, median segment, and basal two segments of the abdomen with only a very few distant punctures; median segment short, sloping laterally from a central longitudinal line, concavo-truncate posteriorly; abdomen massive, the basal segment tuberculate above. Black, with black and scanty ferruginous pubescence; head in front, pro- and mesonotum anteriorly and the basal segment of the abdomen with a ferruginous tint; the antennæ bright yellow, the scape nigro-ferruginous; the legs and apical segment of the abdomen ferruginous, studded with stiff ferruginous hairs; wings fuscous with a coppery, in certain lights a golden, effulgence, nervures and tegulæ ferruginous.

Hab. Bengal. ♀. *Length* 18; *exp.* 36 mm.

171. **Scolia bhamoensis,** *Magretti, Ann. Mus. Civ. Gen.* (2a) xii, 1892, p. 239, ♀.

♀. Head, the pronotum, and propleuræ somewhat closely, the meso- and metanotum densely and deeply punctured, cribrate, the meso- and metapleuræ smooth, shining posteriorly, slightly punctured; the basal abdominal segment coarsely and deeply, the 2nd and 3rd sparsely, and the remaining segments still more slightly punctured; head and pronotum with a thin short pubescence, the tarsi and the abdomen beneath covered with long hairs. Black, the head (the mandibles, the apical margin of the clypeus, the base of the antennæ, and a line above the ocelli excepted), the lateral angles of the pronotum, and a minute line on the margin of the mesonotum above the tegulæ golden or rufo-ferruginous; abdomen above suffused with a blue and purple effulgence; the pubescence on the head and pronotum yellow, on the legs and abdomen black; wings fuscous, with violet and golden effulgence.

Hab. Bhamo, Upper Burma. ♀. *Length* 22 mm.

172. **Scolia fulvifrons,** *Sauss. Mel. Hym.* p. 43, pl. —, fig. 11, ♀; *Sauss. & Sich. Cat. Scol.* p. 116, ♀ ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 106.
Scolia personata, *Smith, Cat.* iii, p. 91.
? Scolia bipunctata, *Klug, Web. & Mohr, Beitr. Naturk.* i, p. 36.

♂. Head, thorax, and abdomen closely and finely punctured and pubescent, the pubescence thick and close on each side of the clypeus, on the back of the head, the pronotum in front, the sides of the thorax, the legs, and abdomen; the anterior ocellus sunk in a pit, a short transverse furrow immediately behind the posterior ocelli; the disc of the mesonotum smooth; the median segment very short, posteriorly concavo-truncate; abdomen very long, nearly twice the length of the head and thorax together. Black, the 3rd and the apical half of the 4th segment yellow; the pubescence black on the black parts of the body, fulvous red on the yellow. *Var.* The head in front yellow.

♀ similar, but with the vertex of the head and two lateral spots on the 3rd segment of the abdomen yellow.

Hab. India (*Sauss.*); Sylhet; Assam; Burma; Tenasserim; Singapore. ♀. "*Length* 37; *exp.* 68 mm." ♂. *Length* 35; *exp.* 68 mm.

Note.—I have described the male in full, as neither in my own nor the British Museum collections are there any female specimens.

*173. **Scolia nobilis,** *Sauss. Ann. Soc. Ent. Fr.* 1858, p. 214, ♀; *Sauss. & Sich. Cat. Scol.* p. 117, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 106.

♀. "Of large or medium size, shining; head impunctate, with fulvous pubescence, front and vertex yellow, antennæ black, their base ferruginous; thorax with fulvous pubescence, densely punctured, cribrate, anteriorly; in the middle and on the scutellum shining, impunctate; metathorax with cinereous pile, shining, lightly punctured; the base of the abdomen with fulvous pubescence; the 2nd and 3rd segments with two spots or bands yellow; the apical segment with fuscous hairs; legs red; wings pale fuscous with a rosy effulgence. Length 25 mm.; wing 21 mm.

"*Hab.* India."

174. **Scolia humeralis,** *Sauss. Cat. Scol., Mantissa,* ii, p. 321; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 102.
Scolia scapulata, *Gribodo, Ann. Mus. Civ. Gen.* (2ᵃ) i, 1884, p. 362.

♀. Head smooth, the thorax and abdomen punctured; clypeus transversely oval, pubescent at the sides; the centre of the median segment and the apex of the scutellum and postscutellum smooth; median segment very short, posteriorly truncate, the truncation convex; abdomen pseudosessile. Black; the head above the base of the antennæ, the shoulders of the prothorax, and a square

macula on each side of the base of the 3rd and 4th segments of the abdomen fulvous red; the pubescence on the abdomen above black, on the clypeus, the back of the head, and the ventral segments of the abdomen silvery white.

♂ similar, but the head black, with only the emargination of the eyes fulvous red.—Varieties have one or both spots on the abdomen reduced to mere specks, or the spot on the 4th segment entirely wanting.

Hab. Burma; Tenasserim, extending to the Malay Peninsula. ♀. *Length* 14–18; *exp.* 26–32 mm. ♂. *Length* 13–17; *exp.* 28–30 mm.

175. **Scolia cucullata**, n. sp.

♀. Head, thorax, and abdomen smooth and shining; the head, mesonotum, scutellum, postscutellum, and abdomen with a few irregularly scattered coarse and deep punctures, pronotum and median segment more closely and finely punctured, the latter posteriorly concave, with the lateral posterior angles somewhat produced; the abdomen pseudosessile, as long as the head and thorax together, the legs densely pubescent and spinose. Black, the head deep red; the mandibles, clypeus, a cowl-shaped mark below the vertex, and the antennæ black, the 3rd and 4th abdominal segments with large deep red maculæ on each side; wings dark fuscous, with a brilliant purple effulgence.

Hab. Sikhim; Bengal. ♀. *Length* 16; *exp.* 27 mm.

176. **Scolia læviceps**, *Smith, Cat.* iii, p. 91, ♀ ♂; *Sauss. & Sich. Cat. Scol.* p. 118.

♀. Head smooth, two or three scattered punctures on the front above the antennæ; thorax and abdomen closely punctured, the punctures finer on the latter; clypeus prominent, with a slight pubescent hollow on each side; back of the head, pronotum in front, and abdomen laterally and beneath thinly pubescent. Black, the pubescence cinereous, that on the legs and abdomen fuscous black.

♂ similar, with erect black pubescence, the thorax and abdomen with finer and closer punctures; the front above the base of the antennæ, and as far as the posterior ocelli raised and marked with a few fine punctures. Wings in both sexes fuscous, with a purple effulgence.

Hab. Sikhim; Burma; Tenasserim; China. ♀. *Length* 15–17; *exp.* 30 mm. ♂. *Length* 12–16; *exp.* 24–30 mm.

177. **Scolia cyanipennis**, *Fabr. Syst. Piez.* p. 244; *Smith, Cat.* iii, p. 90; *Sauss. & Sich. Cat. Scol.* p. 103, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 102.

♀. Head, thorax, and abdomen finely and very closely punctured; the front below the posterior ocelli nearly smooth above,

raised and projecting over the base of the antennæ, its inferior half thickly and finely punctured; median segment broad, concavo-truncate, smooth and shining laterally at the base; basal segment of abdomen campanulate. Black, with sparse black pubescence on the back of the head, the sides of the thorax, the legs, and abdomen, the last with a purple iridescent effulgence; wings dark, fuscous at the base, with a purple and, at apex, with a coppery golden effulgence.

♂ similar, but slighter, and with the wings of a lighter colour.

Hab. Ceylon; Java. ♀. *Length* 18; *exp.* 26 mm. ♂ slightly smaller.

*178. **Scolia carbonaria**, *Sauss. Ann. Soc. Ent. Fr.* 1858, p. 210, ♀; *Sauss. & Sich. Cat. Scol.* p. 106, ♀ ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 103.

♀. "Of largish size, black and pubescent; head and thorax lightly punctured all over, shining; abdomen highly polished and suffused with blue and violet tints, the base constricted, not tuberculate, the apex densely punctured; the flattened calcar of the anterior tibiæ testaceous; wings fuscous black with violet, purple, and blue effulgence, the costal margin obscure.

♂ densely punctured. The front between the antennæ and the ocelli with a quadrate depression transversely carinate, obtuse below, above markedly so. Abdomen densely and profoundly punctured, with a bluish tint. Wings fusco-violaceous, with violet, coppery, and deep blue effulgence, the costa black.

"*Hab.* India. ♀. *Length* 28; *wing* 22 mm. ♂. *Length* 22; *wing* 17 mm."

*179. **Scolia redtenbacheri**, *Sauss. Stettin ent. Zeit.* 1859, p. 186; *Sauss. & Sich. Cat. Scol.* p. 105; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 103.

♀. "Of small size, length of *S. maura*, Fabr. (*i. e.* 18–25 mm.); black, shining, the pubescence entirely black, abdomen and metanotum suffused with violet tints; thorax cribrate, but the middle of the mesonotum and the lateral lobes smooth, sparsely punctured, the metanotum deeply emarginate; the 1st abdominal segment slender, funnel-shaped; wings of a fuscous purple. ♂. More slender, densely punctured all over. *Length* 24; *wing* 14 mm."

Hab. Barrackpore; Java.

180. **Scolia cærulans**, *Lepel. Hym.* iii, p. 526; *Smith, Cat.* iii, p. 87; *Sauss. & Sich. Cat. Scol.* p. 104, ♂.

♂. Head, thorax, and abdomen closely and somewhat coarsely punctured; clypeus scutiform, subconvex, its anterior margin rather acute in the middle; mesonotum with two short, parallel, longitudinally impressed lines on the disc above the tegulæ; the scutellum large, prominent; median segment short, sloped posteriorly, truncate at apex, the truncation slightly concave; legs

short, pubescent and spinose; abdomen long, much longer than the head and thorax together, the basal segment narrow and contracted. Black, with black pubescence on the head, the apex of the median segment, and on the apical two segments of the abdomen above; the abdomen in certain lights with blue and purple reflections; wings fuscous, with a golden and coppery effulgence; nervures and tegulæ brownish black.

Hab. India; Burma; Tenasserim. ♂. *Length* 27–30; *exp.* 49–54 mm.

181. **Scolia indica**, *Sauss. Mel. Hym.* p. 46, pl. —, fig. 10; *Sauss. & Sich. Cat. Scol.* p. 119, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 106.
Scolia ignita, *Smith, Cat.* iii, p. 101, ♀.

♀. The head flat above and smooth, the front of the face and between the antennæ thickly punctured and pubescent; the clypeus with its anterior margin subtriangular and narrowly smooth; thorax with coarse deep punctures; the posterior margin of the pronotum, the middle of the mesonotum, of the post-scutellum, and of the median segment smooth and impunctate; the abdomen also smooth and impunctate, or with a very few scattered punctures above and below. Black, with black pubescence on the front of the face and legs; the sides of the clypeus with a little silvery pile on each side, and the 2nd to the 5th segments of the abdomen with broad bands of stiff ferruginous-red hairs continued below, the apical segment entirely covered with ferruginous pubescence; wings fuscous brown, with purple reflections.

♂ similar, more slightly made, much more finely and closely punctured on the abdomen as well as on the head and thorax; the clypeus convex, almost round; wings of a lighter fuscous brown; the pubescence on the apical segments of the abdomen of a much lighter ferruginous colour.

Hab. Sylhet; North Bengal; Kumaun; Travancore; Burma; Tenasserim. ♀. *Length* 30–40; *exp.* 48–56 mm. ♂. *Length* 20; *exp.* 42 mm.

182. **Scolia quadripustulata**, *Fabr. Spec. Ins.* i, p. 453; *id. Ent. Syst.* ii, p. 234; *id. Syst. Piez.* p. 244; *Lepel. Hym.* iii, p. 528; *Smith, Cat.* iii, p. 87.
Larra quadripustulata, *Fabr. Ent. Syst.* ii, p. 222.
Scolia binotata, *Fabr. Syst. Piez.* p. 244.
Scolia bipunctata (?) et sex-pustulata, *Klug, Web. & Mohr, Beitr. Naturk.* i, pp. 35 & 36.
Scolia fasciato-punctata, *Guer. Voy. Coq.* ii, pt. 2, p. 254.
Scolia fervida, *Smith, A. M. N. H.* (2) ix, 1852, p. 46, ♀.
Scolia stizus, *Sauss. & Sich. Cat. Scol.* p. 118, ♀.

♀. Head and segments 2–5 of the abdomen sparsely and rather coarsely, and the thorax and basal and apical abdominal segments more densely punctured; the clypeus in the middle, the vertex of the head, and the disc of the mesonotum smooth and shining; median

segment short posteriorly, truncate and concave; legs densely pubescent and spinose; abdomen pseudosessile, longer than the head and thorax together. Black, with black pubescence, that on the legs and apical segment of the abdomen reddish brown in certain lights; colouring of the abdomen very variable, any or all of segments 2–5 may have red lateral maculæ, sometimes coalescing in the middle of the segment above and forming a broad fascia at its base; wings dark fuscous with a purple effulgence.

♂ similar, but smaller and slighter, with thick porrect antennæ, which occasionally have an obscure reddish tint at apex.

Hab. Throughout India; Burma; Tenasserim; extending to Sumatra and Java. ♀. *Length* 15–21; *exp.* 27–35 mm. ♂. *Length* 11–16; *exp.* 20–29 mm.

183. **Scolia sikkimensis,** *Bingh. Jour. Linn. Soc., Zool.* xxv, 1896, p. 423, ♀ ♂.

♀. Closely allied to *S. histrionica*, Fabr., but differs as follows:—The clypeus has the middle raised, triangular, flat, and smooth, without punctures, above this a short carina runs up between the bases of the antennæ; the puncturing on the mesonotum and scutellum is much sparser, leaving a central space perfectly bare and smooth; the median segment is narrower, and less concave posteriorly; the basal segment of the abdomen is tuberculate above, more contracted, and somewhat more closely punctured. In colour the clypeus, the front to a little above the base of the antennæ, the apical nine joints of the flagellum of the antennæ, the whole of the thorax except the posterior lateral angles of the median segment, the basal and apical three segments of the abdomen, a narrow fascia above at base of the 2nd, and the apical margins of the 2nd and 3rd segments are black; the front below the vertex, the occiput, the posterior lateral angles of the median segment, a small spot on each side at base of the 1st abdominal segment, the bases of the 2nd and 3rd and a lengthened lateral subapical spot on the 4th, yellow; the scape and basal two joints of the flagellum of the antennæ, and the femora, tibiæ, and tarsi of the legs red with reddish pubescence, which also covers sparsely the thorax and basal segment of the abdomen: beneath, the pectus, the coxæ, and trochanters, and the whole of the abdomen are black: wings brownish hyaline, a long streak beyond the cubital cells and the costal margin of the fore wing darker brown.

♂. The head and thorax pruinose, closely punctured; the abdomen smooth, shining, with scattered punctures; the median segment not truncate but with a steep slope to the apex; the abdomen subfusiform, with the basal segment contracted. Black; the clypeus, the emargination of the eyes, the front below the vertex, a streak behind the eyes, the pronotum, the sides of the prothorax, the tegulæ, a longitudinal streak above them on the mesonotum, the apex of the scutellum and postscutellum in the middle, the sides and a triangular spot in the middle at the apex

of the median segment, the anterior coxæ in front, femora, tibiæ, and tarsi, the intermediate femora and a streak on the tibiæ above, the posterior coxæ in front and the femora, a large spot on each side at base of the 1st segment of the abdomen, the base of the 2nd broadly, and the whole 3rd and 4th above, yellow: beneath, the abdomen has a yellow band on the 3rd and yellow lateral markings on the 2nd and 4th segments: wings somewhat lighter in colour than in the ♀.

Hab. Sikhim; Bengal. ♀. *Length* 20–23; *exp.* 43–45 mm. ♂. *Length* 19–22; *exp.* 40–44 mm.

184. **Scolia histrionica**, *Fabr. Ent. Syst. Suppl.* p. 256; *Sauss. & Sich. Cat. Scol.* p. 121, ♀.
Scolia picteti, *Sauss. Mel. Hym.* p. 42, ♀.
Scolia pulchra, *Smith, Cat.* iii, p. 88, ♀.

♀. Head above and abdomen sparsely but coarsely punctured, the clypeus and front to a little above the antennæ, the thorax, and apical two segments of the abdomen above and below densely punctured; the vertex broad, very slightly convex; median segment short, posteriorly truncate, concave, with the posterior lateral angles produced; legs pubescent and thickly spinose; abdomen broad, pseudosessile, the basal segment slightly tuberculate in the middle above. Variegated with black, red, and yellow, the pubescence reddish, the posterior margins of the abdominal segments ciliated with a mixture of red and black hairs; the clypeus, the face to a little above the antennæ, the region of the ocelli, the mesonotum, the apical margins of the basal three segments of the abdomen, and a median longitudinal streak on the 3rd and 4th, black; the black marking on the basal segment is widest in the middle, that on the 2nd is doubly emarginate anteriorly; the front above, the vertex, back of the head, sides of the pronotum, and bases of segments 2–4 of the abdomen above, yellow; the antennæ, the pronotum in the middle, the scutellum, postscutellum, median segment, legs, basal half of the 1st and apical two segments of the abdomen above, red; wings brownish hyaline, opaque along the nervures of the fore wing, and with an opaque spot in the 2nd discoidal cell and a brownish cloud at the apex beyond the radial cell; nervures testaceous brown; tegulæ red.

Hab. North-west Provinces; Bengal; Bangalore; Burma; Tenasserim. ♀. *Length* 22–25; *exp.* 41–44 mm.

185. **Scolia desidiosa**, *Bingh. Jour. Linn. Soc., Zool.* xxv, 1896, p. 424, ♀.

♀. Head and abdomen sparsely punctured, thorax finely and closely punctured; clypeus transversely oval, reticulate in the middle, punctured at the sides, the space around the ocelli, on the vertex, and behind the eyes smooth and shining; the mesonotum and scutellum in the middle with the punctures coarser and more widely spaced; median segment very short, truncate, the sides a

little produced posteriorly and sparsely punctured; legs densely pubescent and spinose; abdomen smooth and shining, the punctures fine and scattered, the apical margins of the segments ciliated above and below with stiff hairs, the apical segment densely and finely punctured and pubescent. Variegated with black and yellow, the pubescence above and below whitish, the cilia on the segments of the abdomen above black; two spots on the front above the base of the antennæ, the lateral angles of the pronotum, a spot on the mesopleuræ beneath the wings, the scutellum and postscutellum in the middle, the posterior lateral angles of the median segment, and large irregular markings on each side of segments 1–4 of the abdomen, chrome-yellow; the rest of the head, thorax, and abdomen black; the 2nd segment has a black circular spot on each side within the yellow maculæ, the maculæ on the 3rd segment nearly coalesce, those on the 4th are generally united by a narrow line; wings fusco-hyaline, with a distinctly yellow wash, iridescent, somewhat darker along the costal margin: nervures testaceous brown; tegulæ black.

Fig. 16.—*Scolia (Discolia) desidiosa*, ♀. ¾.

♂ similar, but smaller and slighter; the clypeus is yellow, there are no yellow spots on the front; there is a yellow line on all the tibiæ above, and the apical margins of segments 1–5 are yellow, with the anterior margins of these bands on segments 1–4 emarginate anteriorly; beneath, ventral segments 2–4 have a longish yellow spot laterally; wings much lighter than in the ♀.

Hab. Sikhim; Tenasserim. ♀. *Length* 21; *exp.* 36 mm. ♂. *Length* 18; *exp.* 32 mm.

186. **Scolia vivida**, *Smith, Cat.* iii, p. 89, ♂; *Sauss. & Sich. Cat. Scol.* p. 123; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 107.

♂. Head, thorax, and abdomen with fine and close but shallow punctures, and a thin short pubescence: clypeus vertically suboval, its anterior margin rounded, posterior truncate; median segment very short, concavo-truncate; abdomen long, basal segment very slightly constricted at margin. Black, with cinereous pubescence; the clypeus, a spot above it, the mandibles, outer orbits of the eyes, the sides of the pronotum, a patch under the wings, a narrow stripe on the pectus, the scutellum, postscutellum, and abdomen yellow; the median segment laterally deep red; the base and posterior margin of the 1st abdominal segment, and the base of the 2nd–4th with the whole of the apical three segments, black; legs black variegated with yellow; wings hyaline, the fore wing rufescent fulvous along the costal margin, with the apex fuscous anteriorly.

Hab. Madras; Poona. ♂. *Length* 15; *exp.* 25 mm. ♀ unknown.

187. **Scolia venusta**, *Smith, Cat.* iii, p. 90, ♀ ♂ ; *Sauss. & Sich. Cat. Scol.* p. 120, ♀ ♂.

♀. Head, and the 2nd and 3rd segments of the abdomen sparsely punctured; thorax, basal, 4th, and apical segments more closely punctured; head slightly convex in front, an impressed vertical line from the anterior ocellus down the front to the base of the antennæ; median segment with a steep slope to the apex, which is abruptly truncate; legs pubescent and thickly spinose; abdomen pseudosessile, a little longer than the head and thorax together. Black, with rufo-ferruginous pubescence, hairs, and spines; a broad transverse stripe beneath the vertex not reaching the emargination of the eyes, a broad band above on the 2nd and the 3rd segment of the abdomen above, yellow, the band on the 2nd segment with an elongate lateral spot; wings brownish hyaline, the costal margin of the fore wing darker with a faint fuscescent cloud at the apex; nervures and tegulæ testaceous brown.

♂ similar; the head and thorax closely and rather coarsely punctured, abdomen more densely and finely punctured; the head and thorax clothed with dense, and the abdomen with a more sparse, short, soft, yellowish pubescence. Black, two lateral spots on the pronotum, the 2nd and 3rd, apical margin of the 4th, and long lateral spots on the 5th segment of the abdomen above, yellow; beneath, the abdomen is black with subtriangular lateral yellow spots on segments 2–5, those on the 5th segment being faint and barely indicated; wings somewhat lighter than in the ♀.

Hab. Kumaun; Burma; Tenasserim. ♀. *Length* 18; *exp.* 40 mm. ♂. *Length* 18–20; *exp.* 42–44 mm.

188. **Scolia kirbyi**, *Magretti, Ann. Mus. Civ. Gen.* (2ª) xii, 1892, p. 244, ♀ ♂.
Scolia floridula, *Bingh. Jour. Linn. Soc., Zool.* xxv, 1896, p. 425.

♀. Head in front smooth, the space below the antennæ and around the ocelli coarsely punctured, the disc of the thorax cribrate; the thorax posteriorly, and the abdomen less densely, but distinctly and somewhat profoundly punctured. Black, shining, abdomen suffused with blue; the thorax in front fringed with reddish and posteriorly with dense cinereous yellow hairs; head in front, vertex, sides of the pronotum, scutellum, a small round lateral spot at base of the 1st abdominal segment, a suboval lateral spot at the base of the 2nd, a broad line deeply emarginate above and below on the 3rd, and the anterior femora and tibiæ, citron-yellow; wings flavo-hyaline, the costal margin of the front wing opaquely fusco-ferruginous, and the apex with a light fusco-violaceous oval spot; tegulæ rufo-ferruginous.

♂ similar, but differing in having the vertex of the head black, the postscutellum and the femora and tibiæ of all the legs yellow.

Hab. Karen Hills, Burma; Tenasserim. ♀. *Length* 19 mm. ♂. *Length* 16 mm.

189. **Scolia specifica**, *Smith, Cat.* iii, p. 89, ♀ ; *Sauss. & Sich. Cat. Scol.* p. 117 ; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 106.

♀. Very finely and closely punctured, the region of the ocelli somewhat smooth, with a transverse slightly arched furrow passing over the posterior ocelli ; median segment with the sides angular and produced, the apex strongly concave ; abdomen stout, longer than the head and thorax together, basal segment subtuberculate above. Black with black pubesence, the pronotum laterally, and the 2nd, 3rd, and 4th segments laterally marked with yellow, two minute yellow spots at the base of the 5th segment above ; wings fuscous with a purple effulgence.

Var. The pronotum entirely black ; the wings fusco-hyaline, slightly purplish at apex.

Hab. India (*Smith*). ♀. *Length* 19–25 ; *exp.* 36–40 mm.

190. **Scolia eliformis**, *Sauss. Ann. Soc. Ent. Fr.* 1858, p. 215; *Sauss. & Sich. Cat. Scol.* p. 120, ♂ ; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 107.

♂. Head, thorax, and abdomen densely and strongly punctured ; the clypeus subtriangular, convex, its anterior margin arched, smooth and shining, with only a few scattered punctures ; basal segment of the abdomen slightly constricted. Black with black pubescence, segments 2–4 of the abdomen ciliated with grey hairs above and below ; wings light fuscous, subhyaline, nervures and tegulæ black, an oblique hyaline streak in the 1st cubital cell.

Hab. Southern India ; Ceylon. ♂. *Length* 28 ; *exp.* 53 mm. ♀ unknown.

Genus ELIS.

Elis, *Fabr. Syst. Piez.* p. 248 (1804).
Campsomeris, *Lepel. Hym.* iii, p. 496 (1845).
Colpa, pt., *Lepel. Hym.* iii, p. 534 (1845).
Scolia, pt., *Smith, Cat.* iii, p. 85 (1855).
Elis (subgen. Trielis and Dielis), *Sauss. & Sich. Cat. Scol.* pp. 140, 161 (1864).

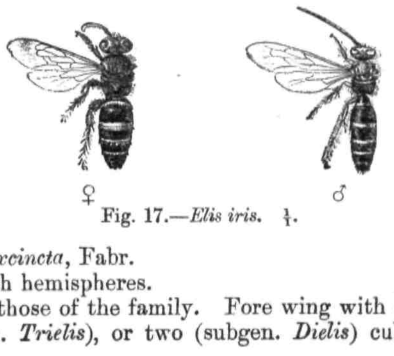

Fig. 17.—*Elis iris.* 1/1.

Type, *E. sexcincta*, Fabr.

Range. Both hemispheres.

Characters those of the family. Fore wing with one radial, and three (subgen. *Trielis*), or two (subgen. *Dielis*) cubital cells and

two recurrent nervures received separately by the 2nd cubital cell. In this genus there is often a very considerable difference in the style of coloration in the two sexes of the same species.

Subgen. TRIELIS: *with 3 cubital cells and 2 recurrent nervures.*

Key to the Species.

a. Head red above, abdomen variegated with red . *E. litigiosa*, p. 90.
b. Head, thorax, and abdomen wholly black ...... *E. orientalis*, p. 90.

191. **Elis litigiosa.**

Scolia litigiosa, *Smith, Cat.* iii, p. 113, ♀.
Elis litigiosa, *Sauss. & Sich. Cat. Scol.* p. 158; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 112.

♀. Head smooth, with a few coarse punctures; clypeus vertically striate; front between and above the base of the antennæ strongly convex, a deeply impressed transverse line level with the emargination of the eyes, receiving in the middle an inter-antennal vertically impressed line starting from the base of the clypeus; thorax with the pronotum truncate in front, and the median segment concavo-truncate posteriorly, sparsely and coarsely punctured on the pro- and mesonotum, scutellum and post-scutellum, and densely on the middle above and posterior face of the median segment; abdomen sparsely punctured, the base of the 3rd and middle of the 4th segment above smooth and shining. Black, the head except the apex of the clypeus and the antennæ, the pronotum, and the 3rd and 4th segments of the abdomen above red; apex of the clypeus, the antennæ, the pronotum in the middle anteriorly, and a central obscure line down the middle of the 3rd and 4th abdominal segments, rufo-piceous; wings dark fuscous with green reflections.

Hab. India. ♀. *Length* 22; *exp.* 38 mm. ♂ unknown.

192. **Elis orientalis,** *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 112.

♀. The clypeus and the front and head above, the mesonotum and the abdomen above sparingly punctured, the rest of the head and thorax densely and coarsely punctured; the space above the antennæ finely and closely punctured; the pronotum and median segment very short, the latter abruptly truncate posteriorly and with a central longitudinal carina ending at the edge of the truncation; the parapsidal furrows well marked and continued down the face of the truncation, which is smooth and shining between the furrows; legs stout, studded with spines and stiff hairs; abdomen massive and long, much longer than the head and thorax put together, basal segment slightly constricted, the segments above and beneath with long scattered pubescence; the ventral segments smooth at base, with subapical broad bands of punctures.

Black with black pubescence; wings dark fuscous with a brilliant purple effulgence; the pubescence at the back of the head greyish.
Hab. Ceylon. ♀. *Length* 17; *exp.* 30 mm.

Subgen. DIELIS: *with 2 cubital cells and 2 recurrent nervures.*

Key to the Species.

A. ♀ known, ♂ unknown.
  a. Abdomen wholly black.
    a'. Wings flavo-hyaline .... *E. habrocoma*, p. 97.
    b'. Wings dark fuscous.
      a^2. Head and thorax with white or fulvous pubescence; abdomen with black .. *E. fimbriata*, p. 99.
      b^2. Head and thorax with black pubescence; abdomen with black, segments 1–3 fimbriated with white .... *E. tristis*, p. 92.
  b. Abdomen red or black, with reddish or yellow markings.
    a'. Abdomen wholly castaneous red ...... *E. erigone*, p. 92.
    b'. Abdomen black, the 2nd segment with lateral yellow marks; 3rd and following segments fuscous red. .... *E. rubromaculata*, [p. 93.
    c'. Abdomen black, segments 1–3 with lateral yellow maculæ.
      a^2. Thorax wholly black .... *E. bella*, p. 93.
      b^2. Thorax black with yellow markings.. *E. eximia*, p. 94.

B. ♀ and ♂ both known.

Females.

  a. Abdomen with uninterrupted transverse yellow bands above. Wings flavo- or fulvo-hyaline, with a subapical fuscous spot on the fore wing.
    a'. Antennæ black.................... ... *E. iris*, p. 94.
    b'. Antennæ fulvous red .... *E. ceylonica*, p. 94.
  b. Abdomen with lateral yellow spots or broad medially-interrupted bands .... *E. luctuosa*, p. 95.
  c. Abdomen wholly black.
    a'. Wings clear hyaline, with a subapical fuscous spot in the fore wing; occiput finely and closely punctured .... *E. annulata*, p. 96.
    b'. Wings flavo-hyaline, with a subapical fuscous spot in the fore wing; occiput smooth, impunctate .... *E. lindenii*, p. 96.
    c'. Wings flavo-hyaline, without a subapical spot in fore wing.
      a^2. Length 25–30 mm.................. *E. grossa*, p. 97.
      b^2. Length 20–22 mm.................. *E. prismatica*, p. 98.
      c^2. Length 8 mm. .... *E. hirsuta*, p. 98.
    d'. Wings fuscous.
      a^2. Basal four abdominal segments ciliated with black hairs .... *E. thoracica*, p. 99.
      b^2. Basal four abdominal segments ciliated with cinereous hairs .... *E. asiatica*, p. 100.
      c^2. Basal four abdominal segments ciliated with fulvous golden hairs .... *E. lindenii* (var.), [p. 96.

Males.

a. Clypeus entirely yellow.	
a'. Basal segment constricted	*E. ceylonica*, p. 94.
b'. Basal segment not constricted	*E. iris*, p. 94.
b. Clypeus yellow, the centre black.	
a'. Posterior margins of segments 1–4 with transverse yellow bands.	
*a*². Length 13–22 mm................	*E. annulata*, p. 96.
*b*². Length 9 mm....................	*E. hirsuta*, p. 98.
b'. Posterior margin of segments 1–5 with transverse yellow bands.	
*a*². Scutellum with yellow markings	*E. grossa*, p. 97.
*b*². Scutellum wholly black	*E. prismatica*, p. 98.
c'. Posterior margins of abdominal segments without yellow markings	*E. thoracica*, p. 99.
c. Base of clypeus black, anterior half yellow.	*E. lindenii*, p. 96.
d. Clypeus entirely black.	
a'. Abdomen black, segments 2 and 3 with lateral yellow spots	*E. luctuosa*, p. 95.
b'. Abdomen black, segments 1–4 with their margins white or yellow.	
*a*². Wings fusco-hyaline	*E. asiatica*, p. 100.
*b*². Wings deep ferruginous...........	*E. cyanea* *, p. 100.
c'. Abdomen entirely black..............	*E. reticulata* *, p. 100.

193. **Elis tristis**, *Sauss. Stettin ent. Zeit.* 1859, p. 265; *Sauss. & Sich. Cat. Scol.* p. 193, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 110.

♀. Head above smooth, almost impunctate; sides and base of the clypeus and the space above the antennæ closely punctured and pubescent; an inter-antennal carina at right angles to a waved transverse one crossing the front about the level of the emargination of the eyes; thorax above coarsely and closely punctured; disc of the mesonotum and the pleuræ smooth and shining; median segment finely punctured, concavo-truncate posteriorly; abdomen long, sparsely punctured, the punctures very shallow and ill-defined. Intensely black, with black pubescence; segments 1–3 of the abdomen fringed, narrowly in the middle, broadening at the sides, with snow-white hairs; wings dark fuscous, with a blue and purple effulgence, nervures piceous, tegulæ shining black.

Hab. "India orientali" (*Sauss.*); Mergui, Tenasserim; Pulo Penang; Singapore; Java. ♀. *Length* 29–38; *exp.* 44–48 mm. ♂ unknown.

194. **Elis erigone**, n. sp.

♀ Head, the vertex, and cheeks smooth; the front above the base of the antennæ and the base of the clypeus pubescent, the former somewhat coarsely punctured; the apical half of the

* Of *E. cyanea* and *E. reticulata* only the males are known.

clypeus longitudinally rugose; pronotum and the back of the head densely pubescent; the mesonotum, scutellum, postscutellum, and median segment coarsely but not very closely punctured, sparsely pubescent: the median segment concavo-truncate posteriorly, above in the middle subtuberculate; abdomen broad, segments 1–4 smooth, fimbriated posteriorly; 5th and 6th coarsely punctured and set with stiff hairs. Vertex of the head, mesonotum, scutellum, postscutellum, and median segment black; mandibles, clypeus, antennæ, pronotum in front, legs, and abdomen castaneous red: pubescence hoary white, reddish on the median segment, legs, and abdomen; wings hyaline and iridescent, suffused with a brownish tint; nervures and tegulæ testaceous.

Var. The whole head, thorax, and abdomen castaneous red.

Hab. The Deccan. ♀. *Length* 18–21; *exp.* 30–40 mm. Type in the British Museum.

195. **Elis rubro-maculata.**

Scolia rubro-maculata, *Smith, Cat.* iii, p. 99, ♀.
Elis rubro-maculata, *Sauss. & Sich. Cat. Scol.* p. 196, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 110.

♀. Head and thorax coarsely and closely punctured, shining; abdomen smooth and shining, with a few fine scattered punctures; the region of the ocelli, the disc of the mesonotum, the scutellum, postscutellum, and median segment smooth and almost impunctate; the 2nd to the 5th abdominal segments with one or two submarginal rows of punctures; the apical segment closely and finely punctured. Black; the head with mixed black and cinereous pubescence: the legs and basal two abdominal segments fringed with black hairs; the 2nd segment with a lateral yellow macula; the base of the 3rd and the following segments deep fuscous red, with the pubescence more or less ferruginous red.

Hab. India (*Smith*); Burma; Tenasserim; Java (*Sauss.*). ♀. *Length* 33–40; *exp.* 62 mm.

196. **Elis bella,** n. sp.

♀. Head and thorax pubescent, very closely and coarsely punctured and rugose under the pubescence; front above the antennæ remarkably prominent and convex, unlike any species known to me; clypeus smooth, its apex angular, the sides oblique; median segment short, concavo-truncate posteriorly, the face of the truncation as closely punctured as the rest of the thorax, and with the punctures running into vertical striæ; the pleuræ impunctate, pruinose; abdomen stout, opaque, the posterior margins of the segments fimbriated; the anal segment studded with short stiff hairs. Black, the posterior margins of abdominal segments 1–3 with abbreviated lateral linear yellow marks; pubescence on the head and thorax ferruginous; the pleuræ covered with silvery pile; the fimbria on the apical margins of segments 1–3 of the abdomen snow-white, and on the 4th and 5th black; the

legs covered with a mixture of black and white stiff hairs and spines; wings flavo-hyaline, fuscous towards the apex, nervures testaceous brown, tegulæ reddish.

Var. The wings light fuscous.

Hab. Assam; Tenasserim. ♀. *Length* 19–25; *exp.* 36–46 mm. ♂ unknown.

*197. **Elis eximia.**

Scolia eximia, *Smith, Cat.* iii, p. 99, ♀.
Elis eximia, *Sauss. & Sich. Cat. Scol.* p. 195; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 110.

♀. Head, thorax, and abdomen smooth and shining, with only a few scattered punctures on the head and thorax. Black; a large macula on the sides of the pronotum in front of the insertion of the wings, the postscutellum, and a spot on each side of the median segment yellow; the wings dark brown with a splendid purple iridescence; the pubescence and spines on the legs black; an ovate macula on each side of the first and three following abdominal segments yellow, those on the 2nd and 3rd largest.

Hab. India. ♀. *Length* 11 lines (24 mm.). Unknown to me. The type specimen is not now in the British Museum.

198. **Elis iris.**

Colpa iris, *Lepel. Hym.* iii, p. 547, ♂.
Scolia iris, *Burm. Abh. Nat. Ges. Halle,* i, pt. 4, p. 26; *Smith, Cat.* iii, p. 100.
Elis phalerata, *Sauss. Ann. Soc. Ent. Fr.* 1858, p. 233.
Elis iris, *Sauss. & Sich. Cat. Scol.* p. 201; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 111.

♀. Head, thorax, and abdomen pubescent; head and abdomen with a few scattered punctures; thorax, except on the centre of the mesonotum, coarsely and closely punctured. Black, the head and thorax covered with coarse fulvous-red pubescence; legs ferruginous red, with coarse fulvous-red spines and stiff hairs; abdomen with the margins of segments 1–4 narrowly yellow above and with a fringe of stiff fulvous-yellow hairs, the apical two segments studded with stiff black hairs; wings fulvo-hyaline, the apex of each fore wing with a dark fuscous macula.

Var. The apex of the clypeus and labrum yellow. Sometimes the abdomen has the segments fringed with cinereous hairs.

♂ similar, but more slender, with the clypeus, the posterior margin of the pronotum, and the tegulæ yellow.

Hab. Sikhim; Southern India; Ceylon; Burma; Tenasserim; Java. ♀. *Length* 16–18; *exp.* 32–35 mm. ♂. *Length* 12–17; *exp.* 30–32 mm.

199. **Elis ceylonica.**

Campsomeris ceylonica, *Kirby, Trans. Ent. Soc.* 1889, p. 452, ♀ ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 111.

♀. Head, thorax, and abdomen pubescent, the pubescence thick

l long on the head, the thorax, and on the median segment ve; head and thorax closely and somewhat coarsely punctured; region of the ocelli and the vertex smooth; the median seg- nt posteriorly concavo-truncate, finely punctured; abdomen ooth, each segment having a double subapical transverse row of ictures. Black, the pubescence rich ferruginous red; the ndibles, clypeus, antennæ, and legs red; the pleuræ and sides the median segment covered with dense golden pile; the apical rgins above of abdominal segments 1–3 with transverse bands rich dark yellow; these bands on the 2nd and 3rd segments ch broader in the middle, with the sides of the broad portion ghtly incurved or emarginate; wings flavo-hyaline, the costal rgin of the front wing rufescent or ferruginous, and the apex h a large subapical spot of fuscous; nervures and tegulæ low.

♂ similar, but slighter, the pubescence not so dense, the basal ment of the abdomen constricted, and the wings having only an lication of the subapical fuscous spot; in colour it differs in ing the clypeus, the pronotum in front, and a broad transverse id on the 4th abdominal segment also yellow.

Hab. Ceylon. ♀. *Length* 15–18; *exp.* 28–32 mm. ♂. *Length* -17; *exp.* 28–30 mm.

0. **Elis luctuosa.**

Scolia luctuosa, *Smith, Cat.* iii, p. 101, ♀.
Scolia quadriguttulata, *Sauss.* (*nec Burm.*) *Mel. Hym.* p. 58, fig. 12.
Elis luctuosa, *Sauss. & Sich. Cat. Scol.* p. 194, ♀ ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 110.

♀. Head and thorax punctured, shining; abdomen smooth, with a few distant punctures; the front between the antennæ very closely and coarsely punctured; the region of the ocelli, the centre of the mesonotum, the scutellum and post-scutellum smooth, the punctures few and distant; abdomen—the basal segment, the posterior margins of the 2nd and 3rd and the whole of the 4th and 5th segments with a few scattered punctures, the basal three-fourths of the 2nd and 3rd and the apical segments dull and opaque. Black, the 2nd and 3rd abdominal segments with yellow lateral spots, the front and the back of the ad with a little cinereous pubescence, the pubescence on the domen and legs black.

Fig. 18.
lis luctuosa, ♀. $\frac{3}{4}$.

♂. The abdomen has a blue effulgence.

Var. with the yellow lateral spots also on the 1st and 4th gments of the abdomen, minute, or entirely wanting.

Hab. Sylhet, Assam; Sikhim; Burma; Tenasserim; Malacca; va; Philippines. ♀. *Length* 33–44; *exp.* 46–56 mm.

201. **Elis annulata.**

Tiphia annulata, *Fabr. Ent. Syst.* ii, p. 225, ♀; *Syst. Piez.* p. 234.
Campsomeris servillii, *Lepel.* (*nec Guer.*) *Hym.* iii, p. 501.
Scolia annulata, *Smith, Cat.* iii, p. 100.
Elis annulata, *Sauss. & Sich. Cat. Scol.* p. 196, ♀ ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 110.

♀. Head, with the vertex and clypeus in the middle smooth, the face above the antennæ densely punctured, with a median short vertical groove; the face in front slightly, the occiput and pronotum anteriorly densely pubescent; thorax with large scattered punctures, the disc of the mesonotum almost impunctate; median segment short, concavo-truncate posteriorly, the punctures in the middle closer, and on the sides above much finer and closer; abdomen—segments 1–4 smooth, nearly impunctate, fimbriated posteriorly, the 5th and 6th segments closely and coarsely punctured and set with stiff rigid hairs. Black, the pubescence white, on the apical segments of the abdomen above it is black; wings hyaline, with a large purplish-fuscous spot at apex.

♂. Smaller, more slender; the basal segment of the abdomen constricted, and all the segments with widely, scattered shallow coarse punctures; head and thorax covered with cinereous pubescence; the clypeus on each side yellow, and segments 1–5 of the abdomen with transverse yellow bands on the posterior margins.

Var. The pronotum, scutellum, and legs variegated with yellow; wings hyaline with a tinge of yellow.

Hab. North-West Provinces; Sikhim; Southern India; Burma; Tenasserim; China; Japan; and Malayan subregion. ♀. *Length* 15–25; *exp.* 28–40 mm. ♂. *Length* 13–22; *exp.* 28–36 mm.

202. **Elis lindenii.**

Campsomeris lindenii, *Lepel. Hym.* iii, p. 500, ♀.
? Scolia quadrifasciata, *Fabr. Ent. Syst. Suppl.* p. 255, ♂.
Scolia radula, *Klug* (*nec Fabr.*), *Web. & Mohr, Beitr. Naturk.* i, p. 30.
Elis lindenii, *Sauss. & Sich. Cat. Scol.* p. 204; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 112.

♀. Head and thorax pubescent, sparsely punctured, the punctures finer and closer about the base of the antennæ; the clypeus, front, and vertex of the head, the disc of the mesonotum, and the abdomen smooth; the last opaque, with the posterior margins of 1st to 4th or 5th segments fimbriated; median segment very short, concavo-truncate posteriorly, the middle above the truncation slightly produced. Black, the pubescence fulvous, golden, hoary-cinereous, or white; wings flavo-hyaline, with a fuscous spot at apex.

Var. Wings altogether fuscous.

♂. Punctured all over, shining. The clypeus anteriorly, the posterior margin of the pronotum, two spots on the scutellum, and transverse fasciæ on the posterior margins of the 1st to 4th or 5th segments of the abdomen yellow; these fasciæ anteriorly emarginate; legs variegated with yellow; wings light flavo-hyaline.

Hab. Throughout Eastern and Southern India (Calcutta, Sikhim, Kumaun, North-West Provinces, Madras); Ceylon; Burma; Tenasserim; Java; China; Japan; and the Malayan subregion. ♀. *Length* 17–22; *exp.* 35–42 mm. ♂. *Length* 16–21; *exp.* 32–40 mm.

203. **Elis grossa.**

Tiphia grossa, *Fabr. Syst. Piez.* p. 232, ♀.
Scolia grossa, *Burm. Abh. Nat. Ges. Halle*, i, pt. 4, p. 23, ♀ ♂; *Smith, Cat.* iii, p. 99.
Elis grossa, *Sauss. & Sich. Cat. Scol.* p. 199, ♀ ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 111.

♀. Head from a little beneath the anterior ocellus to the base of the clypeus very closely and not coarsely punctured, vertex and lower part of clypeus smooth, back of the head and pronotum densely pubescent; mesonotum anteriorly, scutellum moderately, and postscutellum and median segment very finely and densely punctured, the last short, concavo-truncate posteriorly, and pubescent above in the middle; abdomen smooth, opaque; segments 1–4 above fimbriated and with a few scattered punctures, 5th and 6th closely and coarsely punctured and set with stiff hairs. Black, the pubescence on the head and thorax fulvous, the fimbriæ on the abdomen hoary white, the hairs on the apical two segments black, the hairs and spines on the legs mixed black and hoary white; wings light fusco-hyaline with a slight purple effulgence.

Fig. 19.
Elis grossa, ♂. ¾.

♂. Slighter, the basal segment of the abdomen narrower than the 2nd; the whole head, thorax, and abdomen moderately punctured and covered with a thin cinereo-fulvous pubescence, the abdomen with iridescent tints in certain lights. Black; the clypeus except its narrow anterior margin and a spot in the middle, a broad band on the posterior border of the pronotum, two large confluent spots on the scutellum and two on the post-scutellum, a short line on the anterior femora below and on the tibiæ above, a lengthened spot on the intermediate tibiæ above, and broad transverse bands on the posterior margins of the 1st to 4th abdominal segments above, yellow; wings a lighter fusco-hyaline than in the ♀.

Hab. Northern India; Sikhim; Madras; Assam; Burma; Tenasserim; Java. ♀. *Length* 25–30; *exp.* 46–52 mm. ♂. *Length* 23; *exp.* 44 mm.

204. **Elis habrocoma.**

Scolia habrocoma, *Smith, Cat.* iii, p. 100, ♀.
Elis habrocoma, *Sauss. & Sich. Cat. Scol.* p. 198, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 111.

♀. Closely resembles *E. grossa*, Fabr., but is a larger, stouter-built insect; the head and thorax are much more closely (even on the vertex of the former) and coarsely punctured, and the pubescence on the head, thorax, and legs, with the fimbriæ on the segments of the abdomen, are a rich golden fulvous, with no mixture of white hairs; wings flavo-hyaline suffused with a purplish tint.

Hab. India (*Smith*); Sikhim, Assam, and Upper Burma. ♀. *Length* 34–36; *exp.* 58–62 mm.

205. **Elis prismatica.**

Scolia prismatica, *Smith, Cat.* iii, p. 102, ♀.
Elis prismatica, *Sauss. & Sich. Cat. Scol.* p. 199.

♀. Head and thorax closely and rather coarsely punctured, the clypeus, the region of the ocelli, and the disc of the mesonotum smooth; median segment posteriorly concavo-truncate, closely and minutely punctured; abdomen, the basal four segments sparsely, the apical two strongly punctured; head, thorax, and abdomen pubescent, the pubescence thick and long on the head and on the thorax anteriorly, on the abdomen it forms transverse fimbriæ on the posterior margins of segments 1–4. Black, the pubescence ferruginous, the pleuræ and the sides of the median segment covered with dense golden pile; the abdomen with iridescent tints in certain lights; wings flavo-hyaline, slightly fuscous beyond the basal nervure, and in certain lights having a purplish effulgence.

♂ similar, but the pubescence cinereous, the abdomen with brighter iridescent tints, the clypeus yellow, black in the middle, and the abdomen punctured, with transverse yellow bands on segments 1–4 above and on segments 2–5 on the ventral side, the basal segment constricted.

Hab. Sikhim; Burma; Tenasserim; China. ♀. *Length* 20–22; *exp.* 40–44 mm. ♂. *Length* 18–21; *exp.* 38–40 mm.

206. **Elis hirsuta,** *Sauss. Ann. Soc. Ent. Fr.* 1858, p. 234; *Sauss. & Sich. Cat. Scol.* p. 200, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 111.

♀. Head, thorax, and abdomen smooth and shining, very thinly pubescent, the pubescence long on the head and thorax and forming fimbriæ on the posterior margins of the abdominal segments above and below; the lateral angles of the pronotum, the mesonotum anteriorly, the scutellum and postscutellum with a few scattered punctures. Black; the mandibles, the clypeus, and flagellum of the antennæ beneath rather bright castaneous, the femora, tibiæ, and tarsi of the legs and the pygidial area obscurely castaneous, the last studded with short stiff reddish hairs; the pubescence elsewhere silvery white; wings flavo-hyaline suffused with a purplish iridescence.

♂. Slighter; the antennæ filiform and very long, about twice the length of the head and thorax united; head, thorax, and

abdomen black, covered with erect cinereous pubescence; the clypeus, except a spot in the middle, the posterior margin of the pronotum broadly, the scutellum and postscutellum, the posterior margins of the dorsal abdominal segments 1–5 and ventral 2–5, yellow; the legs variegated with yellow; the wings as in the ♀.

Hab. Tranquebar (*Saussure*): Calcutta. ♀. *Length* 10; *exp.* 16 mm. ♂. *Length* 9; *exp.* 15 mm.

207. **Elis thoracica.**

Tiphia thoracica, *Fabr. Ent. Syst. Suppl.* p. 254.
Sphex albicollis, *Christ, Naturg. Ins.* p. 260, pl. 26, fig. 1, ♀.
Sphex flavifrons, *Christ, Naturg. Ins.* p. 261, pl. 26, fig. 2, ♂.
Campsomeris aureicollis, *Lepel. Hym.* iii, p. 499, ♀.
? Scolia aureicollis, *Smith, Cat.* iii, p. 101.
? Elis azurea, *Sauss. Stettin ent. Zeit.* 1859, p. 267, ♂.
Elis thoracica, *Sauss. & Sich. Cat. Scol.* p. 188, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, p. 108.

♀. Head smooth, the front between the antennæ and a little above their bases pubescent, closely and finely punctured; back of the head and pronotum with erect bushy pubescence; mesonotum with a thin covering of scattered hairs; the thorax anteriorly rather coarsely, and the scutellum, postscutellum, and median segment above less coarsely punctured; median segment projecting above in the middle posteriorly, concave below the projection, subtuberculate, the sides smooth; abdomen opaque, with a velvety pruinosity, the posterior margins of the segments fimbriated. Black, the pubescence on the occiput and pronotum hoary white, sometimes rich fulvous (var. *aureicollis*), rest of the pubescence black; wings from light to dark fuscous brown, with a purple effulgence.

? ♂. Slighter, sparsely punctured, the vertex of the head smooth, the basal segment of the abdomen constricted, the pubescence cinereous or fulvous. Black, the clypeus yellow with a central black mark; the segments of the abdomen posteriorly fimbriated with cinereous pubescence, above suffused with blue and violet tints; wings flavo-hyaline.

Hab. Kumaun; Sikhim; Bangalore; Madras; Burma; Tenasserim; China; Java. ♂ ♀. *Length* 18–21; *exp.* 32–38 mm.

208. **Elis fimbriata.**

Scolia thoracica, *Klug* (*nec Fabr.*), *Weber u. Mohr, Beitr. Naturk.* i, p. 33.
Campsomeris collaris, *Lepel.* (*nec Fabr.*) *Hym.* iii, p. 498.
Scolia fimbriata, *Burm. Abh. Nat. Ges. Halle*, i, pt. 4, p. 25; *Smith, Cat.* iii, p. 100.
Elis fimbriata, *Sauss. & Sich. Cat. Scol.* p. 189, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1892, p. 109.

♀. Very closely resembles *E. thoracica*, Fabr., but is always much larger, and has the mesonotum, scutellum, and postscutellum much more closely punctured. Like *E. thoracica*, there is a variety with fulvous-red pubescence on the occiput and thorax in front.

wholly red (var. *erythrosoma*), or any of the 1–5 ♀, 1–6 ♂, segments may be red or black.

Hab. Throughout India, Burma, and Tenasserim; extending into the Malayan and even into the Australian subregions. ♀. *Length* 26–33; *exp.* 45–50 mm. ♂. *Length* 19–22; *exp* 38–44 mm.

213. **Liacos fulvopicta.** (Pl. I, fig. 4.)
Cam. Mem. Manch. L. Ph. Soc. (4) v, 1892, p. 98, ♂.

♂. Closely resembles some forms of *L. analis*, Fabr., but differs in having the apical half of the abdomen fulvous with fulvous pubescence, not ferruginous, in the head, thorax, and abdomen, especially the last, being much more closely punctured, and being on the whole, sex for sex, a stouter, broader insect.

Hab. Barrackpore, Bengal. ♂. *Length* 25; *exp.* 44 mm. Type in coll. Rothney.

Family POMPILIDÆ.

Fossorial and predatorial wasps of very varying size, containing some very small species as well as some of the largest forms among the Hymenoptera.

Head more or less lenticular in shape. Prothorax of variable size and length, the pronotum, however, always reaching back to the base of the wings. Wings generally long and ample, in one genus only (*Parapompilus* *) extraordinarily short; fore wing with one radial and *two* or *three* complete cubital cells †. When two cubital cells only are present, the 2nd receives both the recurrent nervures; when there are three cubital cells, the 2nd receives the 1st, and the 3rd the 2nd recurrent nervure. Legs long, reaching well beyond the apex of the abdomen; armature of the legs variable, dependent on function. Abdomen pseudosessile, never actually petiolate as in some of the *Sphegidæ*, but the basal segment of the abdomen at its attachment to the median segment is often attenuated.

The difference between the sexes is well marked, sometimes it is very striking. The males are, as a rule, smaller, and more slenderly built; the antennæ are porrect; in the females these organs, after death, are convolute at apex ‡. The apical three abdominal segments in the male are essentially different from those in the female. If the median segment is not included, the female has *six*, the male *seven* visible abdominal segments.

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* Not known to occur in India.

† In the genus *Ceropales*, by the extension of the cubital nervure to the margin of the wing, a 4th complete cubital cell is formed, but the character is not constant.

‡ Except in the genus *Ceropales*, the females of which have porrect antennæ.

The species of *Pompilidæ* generally make their nests in the ground, in burrows dug by the female, or in holes in trees, chinks in the floors or walls of wooden houses, or in the hollows of bamboos. *Agenia*, *Pseudagenia*, *Paragenia*, and, I suspect, *Macromeris* too, construct little earthen shells for nests. As a rule, spiders are provided as food for the future brood, but one or two species are predatorial on crickets (*Gryllidæ*), cockroaches (*Blatta*), and Coleoptera. No parasitic forms are known among the *Pompilidæ*.

Key to the Genera.

A. Fore wing with *three* complete cubital cells.
  a. Thorax below in front of the intermediate coxæ produced into lateral tubercles.... MACROMERIS, p. 103.
  b. Thorax below not tuberculate.
    a'. Second ventral segment with a transverse furrow.
      a^2. Posterior tibiæ grooved above, not cylindrical.
        a^3. Posterior tibiæ smooth, or with only a few minute spines, never serrate.
          a^4. Joints of anterior tarsi much attenuated at base; intermediate coxæ in ♂ produced into remarkable tubercles anteriorly...................... PARAGENIA, p. 105.
          b^4. Joints of anterior tarsi normal, not attenuate at base; intermediate coxæ in ♂ not tuberculate .... PSEUDAGENIA, p. 106.
        b^3. Posterior tibiæ more or less thickly spinose, in ♀ generally serrate .. SALIUS, p. 122.
      b^2. Posterior tibiæ cylindrical, with minute spines .... POMPILUS (group *Ferreola*), p. 169.
    b'. Second ventral segment without a transverse furrow.
      a^2. Anterior tibiæ and tarsi ciliated on the outer side .... POMPILUS, p. 147.
      b^2. Anterior tibiæ and tarsi not spinose or ciliated .... CEROPALES, p. 173.
B. Fore wing with *two* complete cubital cells only .... APORUS, p. 177.

Genus **MACROMERIS.**

Macromeris, *Lepel. Guér. Mag. Zool.* i, pl. 29 (1831); *id. Hym.* iii, p. 463 (1845); *Smith, Cat.* iii, p. 181; *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 41.

Type, *M. splendida*, Lepel.

Range. The Oriental region, extending to New Guinea.

Head flat; thorax massive, with lateral tubercles beneath, in front of the intermediate coxæ, the tubercles somewhat in the

shape of mammæ; legs massive, especially the coxæ and femora, which in the ♂ are disproportionately thick, with the femora sometimes flattened beneath into thin laminæ, and serrated, the serrations blunt; tibiæ and tarsi absolutely without spines and bearing only a little thin covering of long soft hairs. Wings very broad; the fore wing with the radial cell rounded at apex; three cubital cells, the 2nd, slightly smaller than the 1st or the 3rd, receives the 1st recurrent nervure towards the apex, the 3rd cubital cell receives the 2nd recurrent nervure about the middle: basal nervure interstitial, or taking its rise beyond the apex of the 1st submedial cell; the cubital nervure in the hind wing interstitial with the transverse anal nervure.

Fig. 21.—*Macromeris violacea*, ♂. 1/1.

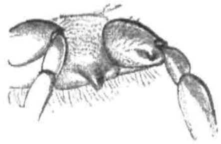

Fig. 22.—Side view of thorax showing tubercle in front of intermediate coxæ.

The habits of the species belonging to this genus are almost unknown. Once I observed a female carrying some large hairy spiders (*Heteropoda venatoria*) to a chink in a deserted wooden house, in the forests in Tenasserim, and there is no doubt she was storing these as food for her future progeny.

Only three species are known, of which, so far as I know, only one, *M. violacea*, Lepel., is found within our limits. Smith, however (*loc. cit.*), gives *M. splendida* as coming from India too, but there is no specimen of it from India in the British Museum collection, nor have I seen it in any other collection from India, Burma, Tenasserim, or Ceylon. It, as well as the third species recently described by me (Jour. Linn. Soc. 1896, p. 438), may occur; I give, therefore, a key to easily discriminate the three species.

Key to the Species.

A. Wings dark fuscous.
  a. Wings coppery, golden or ferruginous at base, dark fuscous brown, with a rich purple and blue effulgence on the apical half .... *M. splendida*.

b. Wings entirely dark fuscous throughout, with a rich purple and blue effulgence.... *M. violacea*, p. 105.
B. Wings flavo-hyaline .... *M. castanea.*

So far as I know, *M. splendida* and *M. castanea* occur only in Java and the Indo-Malayan subregion.

214. **Macromeris violacea**, *Lepel. Guér. Mag. Zool.* 1831, pl. 30, ♂; *id. Hym.* iii, p. 464, ♂; *Smith, Cat.* iii, p. 181; *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 435.
Macromeris iridipennis, *Smith, Jour. Linn. Soc.* 1859, p. 156, ♀ ♂, var.

♀. Head, pro- and mesonotum densely pruinose; scutellum, postscutellum, and legs smooth and shining; median segment above finely rugose; abdomen sparsely pruinose, with a very short recumbent pile; head and thorax with scattered long pubescence, somewhat dense on the clypeus; legs long, the tibiæ and tarsi without spines, the coxæ and femora stout, thick; abdomen fusiform, subpetiolate, the apical two segments studded with long erect hairs. Black, with beautiful purple and blue reflections in certain lights, the metanotum dull and opaque; the pubescence on the head, thorax, and apex of the abdomen velvety black; wings dark brown, with a most brilliant purple effulgence changing in different lights.

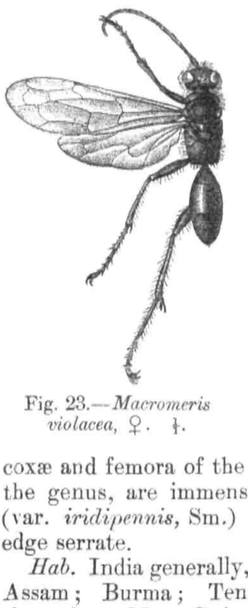

Fig. 23.—*Macromeris violacea*, ♀. ½.

♂. Precisely similar in colour and pubescence; differs only in the form of the coxæ and femora of the legs, which, as noted in the description of the genus, are immensely thickened, and in some specimens (var. *iridipennis*, Sm.) the femora are laminated below and the edge serrate.

Hab. India generally, except in the very dry regions; Andamans; Assam; Burma; Tenasserim, and the Malayan region right through to New Guinea. ♀. *Length* 25–30; *exp.* 58–66 mm. ♂. *Length* 22–26; *exp.* 56–60 mm.

Genus PARAGENIA.

Macromeris, pt., *Smith (nec Lepel.) Jour. Linn. Soc.* 1858, p. 97.
Paragenia, *Bingh. Jour. Linn. Soc.* 1896, p. 429.

Type, *P. argentifrons*, Smith.

Range. The Indo-Malayan subregion.

Head in front slightly convex; eyes with the inner orbits arcuate and converging above and below, extending beneath to the base of the mandibles; thorax, especially in the male, massive; median

segment rounded posteriorly, with a rather steep slope to the apex, and a median longitudinal shallow furrow; legs long, the coxæ and femora (♂) massive, fore tarsus with the joints remarkably attenuate at their bases, posterior coxæ (♂) produced anteriorly into a prominent conical tubercle; armature of the legs feeble, the posterior tibiæ and tarsi with a few minute spines, anterior tibiæ with a row of minute spines on the outside (♀); claws unidentate at base below; wings as in *Pseudagenia*; abdomen fusiform, the base attenuate, almost petiolate, the 2nd ventral segment with a transverse furrow at base.

Fig. 24.—*Paragenia argentifrons*, ♂. 1/1.

The only species at present known has the habits of *Pseudagenia*. I found it in July making little clay cells like *Eumenes* and filling them with spiders (*Araneus*).

215. **Paragenia argentifrons.**

Macromeris argentifrons, *Smith, Jour. Linn. Soc.* 1858, p. 97, ♀ ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 436.
Paragenia argentifrons, *Bingh. Jour. Linn. Soc.* 1896, p. 429.

♀. Head and the thorax in front opaque, densely pruinose; abdomen with sparser pile, smooth and shining; the sides of the postscutellum obliquely and the base of the median segment transversely striate, the rest of the median segment with a rounded slope to its apex and obscure fine irregular striæ; legs long, the tibiæ and tarsi with minute spines; abdomen fusiform, with a distinct petiole. Black; the face in front, the thorax above and at the sides, the coxæ and the trochanters of the legs clothed with a glittering silvery pile, having a green tint in certain lights; the anterior femora above, and the intermediate and posterior pair ferruginous red; the abdomen covered with a thin silky pile; the wings flavo-hyaline, the tegulæ and nervures testaceous brown.

♂. The thorax more massive, the abdomen shorter, the joints of the anterior tarsi at base extremely attenuated, and the coxæ of the intermediate legs produced anteriorly into an obtuse tubercle.

Hab. Sikhim; Assam; Burma and Tenasserim, extending to the Malayan region. ♀. *Length* 17–20; *exp.* 35–40 mm. ♂. *Length* 16–20; *exp.* 33–40 mm.

Genus **PSEUDAGENIA.**

Sphex, pt., Evania, pt., Ceropales, pt., *Fabr. Syst. Piez.* (1804).
Agenia, *Dahlb.* (*nec Schiödte*) *Hym. Eur.* i, p. 454 (1845).
Anoplius, pt., *Lepel. Hym.* iii, p. 440 (1845).
Pompilus, pt., *Smith, Cat.* iii, p. 118 (1855).
Pilpomus, pt., *Costa, Faun. Regn. Nap., Imenot. Acul., Pompili*, p. 3 (1859).
Pseudagenia, *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 42.

Type, *P. carbonaria*, Scop.

Range. Over both hemispheres.

General form of the insect long and slender, with long unarmed legs, the fore tarsi not ciliated, and the spines on the tibiæ and tarsi small and inconspicuous, or altogether wanting; wings with three cubital cells, the 3rd always much larger than the 2nd; abdomen shortly petiolate, the 2nd ventral segment with a transverse furrow.

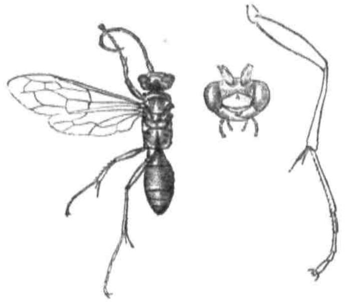

Fig. 25.—*Pseudagenia clypeata*, ♀. $\frac{2}{1}$.

The insects belonging to this genus, so far as known, build little clay cells, like *Sceliphron* and *Eumenes*, and fill them with spiders, as provision for the larvæ.

Key to the Species.

A. Wings yellow, apex infuscate.
- *a*. Head, thorax, and abdomen black.
  - *a'*. Head, thorax, and abdomen covered with dense glistening golden pile .... *P. honesta*, p. 109.
  - *b'*. Head, thorax, and abdomen without golden pile; head and thorax marked with yellow .... *P. atalanta*, p. 109.
- *b*. Head, thorax, and abdomen pale reddish yellow .... *P. deceptrix*, p. 110.
- . Head, thorax, and basal half of abdomen red, apical half of abdomen black .... *P. frauenfeldiana*, [p. 110.

B. Wings fuscous or fusco-hyaline.
- *a*. Fore wing fuscous, hind wing hyaline.
  - *a'*. Fore wing entirely dark fuscous with a purple effulgence .... *P. artemis*, p. 111.
  - *b'*. Fore wing hyaline at base, dark fuscous for apical two-thirds .... *P. danaë*, p. 111.
- *b*. Both wings entirely fuscous.
  - *a'*. Wings light fusco-hyaline.
    - a^2. Head, thorax, and abdomen black with a blue tint in certain lights .. *P. ariel*, p. 112.
    - b^2. Head and thorax black, abdomen red.
      - a^3. Median segment lightly transversely striate, not or scarcely sulcate down the middle .... *P. concolor*, p. 112.

b^3. Median segment markedly transversely striate, with a narrow medial longitudinal furrow .... *P. pedunculata*, p. 112

c^2. Head, greater part of thorax, and abdomen red; median segment black. *P. obsoleta*, p. 113.

b'. Wings dark fuscous with violet and purple effulgence

a^2. Abdomen red .... *P. insularis*, p. 113.

b^2. Abdomen black.................. *P. plebeja*, p. 114.

C. Wings clear hyaline.

a. Head, thorax, and abdomen metallic blue.. *P. blanda*, p. 114.

b. Head, thorax, and abdomen black.

a'. Clypeus white or with lateral white spots.

a^2. Abdomen black.................. *P. clypeata*, p. 114.

b^2. Abdomen black, posterior margins of the segments narrowly white...... *P. albilabris*, p. 115.

b'. Clypeus black.

a^2. Thorax in front transverse, the inferior lateral angles anteriorly produced.. *P. stulta*, p. 115.

b^2. Thorax in front rounded, the inferior lateral angles not produced........ *P. tincta*, p. 116.

D. Wings clear hyaline, or hyaline with a yellowish tint, with one fuscous subapical fascia.

a. Median segment narrowly furrowed down the middle.

a'. Posterior femora red.

a^2. Clypeus and sides of face in front white.......................... *P. bipennis*, p. 116.

b^2. Clypeus and sides of face in front black.......................... *P. hypsipyle*, p. 116.

b'. Posterior femora black.

a^2. Basal nervure of fore wing interstitial *P. veda*, p. 117.

b^2. Basal nervure of fore wing not interstitial..................... *P. alaris*, p. 117.

b. Median segment not furrowed down the middle .... *P. lævicula*, p. 118.

E. Wings clear hyaline, or hyaline with a yellow tinge, with two fuscous fasciæ on the fore wing.

a. Thorax black.

a'. Inner fascia on wings narrower than outer.

a^2. Median segment long, sulcate down the middle.

a^3. Minute (L. 6 mm.); a red spot in sinus of eyes.................. *P. micromegala*, p. 118.

b^3. Larger (L. 14–17 mm.); no red spot in sinus of eyes .... *P. callisto*, p. 119.

b^2. Median segment not sulcate down the middle .... *P. acricula*, p. 119.

b'. Inner fascia broader than outer ...... *P. erigone*, p. 119.

b. Thorax red .... *P. ægina*, p. 120.

F. Wings hyaline or flavo-hyaline, the apex fuscous.
- *a*. Abdomen black, or black with grey or silvery pile.
  - *a'*. Wings with a decided yellow tinge; posterior tibiæ immaculate .... *P. rava*, p. 120.
  - *b'*. Wings hyaline without any yellow tinge; posterior tibiæ with a yellow spot at base above .... *P. nana*, p. 121.
- *b*. Abdomen red .... *P. juno*, p. 121.

G. Wings hyaline, the disc of the fore wing with faint fuscous spots or clouds .... *P. cærulea*, p. 121.

216. **Pseudagenia honesta.**

Pompilus honestus, *Smith, Cat.* iii, p. 144, ♀ (*nec* Agenia honesta, *Smith, Jour. Linn. Soc.* 1861, p. 80); *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 459.

♀ ♂. Head, thorax, and abdomen densely pruinose; antennæ and legs except the coxæ bare and smooth; clypeus convex, oval, its anterior margin toothed in the middle; eyes converging at the vertex; median segment with a rounded slope posteriorly, transversely striate and with a shallow medial longitudinal furrow at apex; legs long, the tibiæ nearly smooth with only a few minute spines; abdomen subpetiolate. Head, thorax, and abdomen black, but in fresh specimens so densely covered with a thick golden pile intermixed with long golden hairs, that none of the ground-colour shows through; antennæ and legs ferruginous; wings flavo-hyaline, the apex of the fore wing beyond the 2nd cubital cell fuscous, nervures and tegulæ ferruginous.

Fig. 26.—*Pseudagenia honesta*, ♀. $\frac{1}{1}$.

Hab. India, Burma, and Tenasserim. ♀. *Length* 17–22; *exp.* 32–38 mm. ♂. *Length* 14–16; *exp.* 32–36 mm.

217. **Pseudagenia atalanta.**

Agenia atalanta, *Smith, Jour. Linn. Soc.* 1858, p. 94, ♂.
Pseudagenia atalanta, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 436.

♂. Head, thorax in front, and abdomen smooth, median segment with a thin, short, scanty pubescence; clypeus large, convex, its anterior margin transverse, oblique at the sides; front with a deep vertically impressed line from the anterior ocellus to between the base of the antennæ; scutellum and postscutellum very prominent, laterally compressed and tuberculate; median segment with a steep slope, rounded posteriorly, lightly transversely striate above, and with a short subtriangular deeply impressed furrow at apex;

abdomen fusiform. Black; the clypeus, the sides of the face up to the vertex, *a line behind the eyes, a broad stripe on the posterior* margin of the pronotum, a square spot at apex of mesonotum, the scutellum and postscutellum in the middle, and the apex of the femora, the tibiæ, and tarsi of the legs chrome-yellow; the posterior tibiæ at apex, and the apical joint of the intermediate and posterior tarsi fuscous; wings flavo-hyaline with a golden lustre, the apex deeply infuscated.

Hab. Sylhet, probably also Burma and Tenasserim; the Malay subregion as far as Celebes. ♂. *Length* 16; *exp.* 34 mm.

218. **Pseudagenia deceptrix.**

Pompilus deceptor, *Smith, Jour. Linn. Soc.* 1859, p. 12, ♂ (*nec* Agenia *recte* Pseudagenia deceptor, *Smith, A. M. N. H.* (4) xi, 1873, p. 447).

♀. Head and thorax in front dull, opaque, very finely and minutely punctured; median segment transversely striate; abdomen smooth, polished and shining; clypeus subconvex, its anterior *margin produced, subangular in the middle, oblique at the sides*; pronotum very short, anteriorly somewhat truncate, the truncation rounded; median segment long, bulging at the sides, rounded posteriorly, with a very gradual slope to the apex, and bearing a medial, broad, but shallow longitudinal furrow; legs long, the tibiæ and tarsi with very minute spines; abdomen short, petiolate, not so long as the thorax. Pale reddish yellow, the apical three joints of the flagellum of the antennæ fuscous; wings light flavo-hyaline, the apex beyond the 1st cubital cell broadly and lightly pubescent.

♂ similar but slighter, the vertex and mesonotum generally fuscous black.

Hab. Bengal; Burma; Tenasserim; Celebes. ♀. *Length* 15–18; *exp.* 34–38 mm. ♂. *Length* 13; *exp.* 35 mm.

219. **Pseudagenia frauenfeldiana.**

Agenia frauenfeldiana, *Sauss. Novara Reise, Hym.* p. 53, pl. iii, fig. 35.

Pseudagenia frauenfeldiana, *Cam Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 437.

♀. Head, thorax in front, and abdomen smooth, but not shining; the clypeus convex, its anterior margin rounded and projecting; the postscutellum and median segment transversely striated, the former with a longitudinal broad sulcation in the middle, the latter with a rounded regular slope to its apex; legs long, their armature feeble, the tibiæ almost smooth; abdomen subpetiolate and fusiform. Variegated with red and black, the head red, the face above the antennæ with a crown-shaped mark and above this a broad **V**-shaped macula, black; thorax and abdomen red, the sides, the apex of the metanotum, the coxæ and trochanters, the apical half of the 2nd and the whole of the following segments of the abdomen black; wings flavo-hyaline, the

apex of the fore wing fuscous from beyond the middle of the 2nd cubital cell, nervures and tegulæ testaceous. Specimens vary in having more or less of the red or the black colour predominant.

Hab. Tenasserim; Java. ♀. *Length* 11–14; *exp.* 18–23 mm. ♂ unknown.

220. **Pseudagenia artemis,** *Bingh. Jour. Linn. Soc.* 1896, p. 427, ♀.

♀. Head, pro- and mesonotum, scutellum, postscutellum, and abdomen smooth and shining, metanotum and the pleuræ transversely striate; clypeus convex, its anterior margin subangular; median segment with a rounded steep slope to its apex; legs long, the intermediate and posterior tibiæ and tarsi with very minute spines, almost smooth; abdomen with the basal segment less petiolate than in most of the species of the genus. Dark cobalt-blue; the antennæ, femora, tibiæ, and tarsi of the legs opaque black; the fore wing dark fuscous with a purple effulgence, the hind wing hyaline, very slightly pubescent at apex, nervures and tegulæ piceous; the face in front, the sides of the thorax, and the median segment covered with a soft sparse silvery white pubescence.

Hab. Tenasserim. ♀. *Length* 19; *exp.* 40 mm.

221. **Pseudagenia danaë,** *Bingh. Jour. Bomb. N. H. Soc.* 1896, p. 205, ♀ ♂, pl. i, fig. 12, ♀.

♀. Head, thorax, and the coxæ of the legs densely pruinose, abdomen thinly pruinose, the antennæ, trochanters, femora, tibiæ, and tarsi bare and smooth; clypeus oval, convex, its anterior margin narrowly smooth and shining; median segment with a rounded slope posteriorly, a broad shallow furrow down the middle, two shorter lateral ones, and coarse transverse striations; legs long, with the tibiæ and tarsi smooth, or with only very minute short spines; abdomen subpetiolate. Black, the head, thorax, and the coxæ of the legs covered with dense golden pile; the scape of the antennæ, the trochanters, femora, tibiæ, and tarsi of the legs ferruginous; the fore wing hyaline up to the basal nervure, beyond fuscous, hind wing hyaline with a broad very light fuscous margin at apex; abdomen covered with a very thin silvery pile, the posterior margins of the segments testaceous.

♂. The head, thorax, and abdomen covered with a sericeous silvery pile, very dense on the sides of the clypeus and the inner margin of the eyes; the whole of the antennæ, the trochanters, tibiæ above and the tarsi of the anterior legs, and the trochanters and tarsi of the intermediate and posterior legs more or less fuscous black; the femora, tibiæ below of the anterior, the femora and tibiæ of the intermediate and posterior legs, with the basal two segments of the abdomen, ferruginous red; the wings are fusco-hyaline, a little paler at base.

Hab. Sikhim, Assam, Burma, and Tenasserim. ♀. *Length* 17–25; *exp.* 36–41 mm. ♂. *Length* 12–15; *exp.* 29–32 mm.

222. **Pseudagenia ariel,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 436 & 439

♀. Pruinose; head convex in front, eyes slightly converging beneath; clypeus convex, subtriangular, toothed in the middle, an indistinct vertical furrow on the front; the pronotum short, broad, rounded anteriorly; median segment with a rather steep slope to apex, transversely striate; legs long, the tibiæ and tarsi nearly smooth; abdomen petiolate, the petiole short. Black, with deep blue tints in certain lights; the antennæ, tibiæ, and tarsi opaque black; the clypeus, front of the head, and sides of the median segment with dense silvery pile and some long white hairs; wings subhyaline, slightly suffused with fuscous.

Hab. Barrackpore, Bengal; Tenasserim. ♀. *Length* 9; *exp.* 20 mm.

223. **Pseudagenia concolor.**

Agenia concolor, *Sauss. Novara Reise, Hym.* p. 54, ♂.
Pseudagenia concolor, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 437.

♂. Resembles *P. insularis*, Sauss., but is more slender in form, with the thorax strongly compressed, narrower, and longer; clypeus long, transversely truncate; labrum transverse and subemarginate; postscutellum obsoletely striate on both sides, metanotum with no median sulca and not transversely striate; abdomen slender, fusiform, vertically compressed, nearly as long as the head and thorax put together. Black, the head, thorax, and coxæ with silvery pile; the apex of the mandibles and the palpi ferruginous; legs and abdomen red, the coxæ and tarsi pubescent; wings obscurely fuscous, with a violet and purple effulgence, the apical margin slightly darker.

Hab. Ceylon. ♂. *Length* 14; *exp.* 27 mm.

224. **Pseudagenia pedunculata.**

Pompilus pedunculatus, *Smith, Cat.* iii, p. 145, ♀.
Salius pedunculatus, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891 p. 452.

♀. Head, thorax in front, and abdomen smooth, median segment transversely striate; clypeus transversely oval, its anterior margin rounded and toothed in the middle; front with an obscure impressed line from the anterior ocellus to between the base of the antennæ; pronotum short, rounded in front, and considerably narrowed towards the head; median segment rounded and prominent, with an obscure impressed line longitudinally down the middle; legs long, rather stout, the tibiæ and tarsi with minute spines; abdomen shorter than the thorax, petiolate. Head thorax, and the coxæ of the legs black; the trochanters, femora

tibiæ, and tarsi bright orange-brown, abdomen reddish brown; the fore wing fusco-hyaline, the hind wing hyaline, lightly fuscescent towards the apex.

Hab. N. India; Sikhim; Barrackpore. ♀. *Length* 12–15; *exp.* 23–25 mm.

225. **Pseudagenia obsoleta.**

Agenia obsoleta, *Sauss. Novara Reise, Hym.* p. 56, ♀, pl. iii, fig. 37, ♂.

Pseudagenia obsoleta, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 438.

♂. Head not so wide as the thorax; clypeus emarginate; labrum large, oval; the front of the face flat, divided by a vertical furrow, and tuberculate below; eyes parallel; thorax long, quadrate, truncate anteriorly and posteriorly; pronotum short, posterior margin arched; scutellum and postscutellum raised in the middle and laterally compressed; median segment cubical in form, abruptly truncate posteriorly, above smooth or slightly punctured; abdomen sessile, ovate, vertically flattened, finely and densely punctured. Head, antennæ, pro- and mesonotum, tegulæ, the scutellum, legs, and abdomen red; the head and thorax with golden red pile; the rest of the thorax and the coxæ with black, sometimes fulvous-tinted pile; the margins of the segments of the abdomen above black in the middle; wings fuscous, with a fulvous and towards the apex violet effulgence. Varieties have the metanotum marked with red, or entirely red, and the coxæ reddish; others are more slender, with the margination of the clypeus angular, the thorax entirely black with cinereous and silvery pile.

Hab. Ceylon. ♀. *Length* 17; *exp.* 32 mm.

*226. **Pseudagenia insularis.**

Agenia insularis, *Sauss. Novara Reise, Hym.* p. 55, ♀.

Pseudagenia insularis, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 437.

♀. Allied to *P. obsoleta*, Sauss., but abundantly different. Clypeus longer, convex, its anterior margin arched, and incised in the middle, and wrinkled; frontal tubercle subtruncate, the sinus deeper; pronotum with the posterior margin subcaniculate, arched and markedly angular; scutellum convex, postscutellum divided by an obsolete furrow and obliquely striate on the sides; median segment not truncate, slightly sloping, convex, with a central longitudinal furrow; abdomen fusiform and compressed vertically. Head and thorax black, abdomen and legs red, the coxæ and extreme base of the abdomen black; wings dark fuscous with a purple effulgence.

Hab. Ceylon. ♀. *Length* 17; *exp.* 32 mm.

I have not seen either this species or *P. concolor*, Sauss., which seems closely allied to it. Both, so far as their description goes, seem to be very similar to *P. pedunculata*, Smith. It is possible that all three are forms of one species.

227. **Pseudagenia plebeja.**

Agenia plebeja, *Sauss. Novara Reise, Hym.* p. 57, ♂.
Pseudagenia plebeja, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 438.

♂. Head pruinose, thorax and abdomen smooth; clypeus convex, its anterior margin widely emarginate; the front with a vertical furrow, tuberculate above the antennæ; pronotum short, subangular, its posterior margin arched, the suture profound; median segment rounded posteriorly, short; abdomen longitudinally and very finely aciculate. Head with cinereous, sometimes yellowish pile; thorax and abdomen with fuscous hairs, and an obscure subpurple or chalybeous pruinosity; the antennæ beneath, a spot on the middle of the mandibles, a spot on the front along the interior orbits, a stripe behind the eyes, with the tegulæ, fusco-rufous; legs with a fuscous and anteriorly rufescent pile; wings fuscous with a violet effulgence.

Hab. Ceylon. ♂. *Length* 17; *exp.* 32 mm.

228. **Pseudagenia blanda.**

Pompilus blandus, *Guér. Voy. Coq., Zool.* ii, pt. 2, p. 260; *Smith, Cat.* iii, p. 143.
Anoplius cyaneus, *Lepel. Hym.* iii, p. 446.
Agenia blanda, *Smith, Jour. Linn. Soc.* 1867, p. 354.
Pseudagenia blanda, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 436.

♀. Head, fore part of the thorax, and abdomen smooth and shining, median segment transversely striated; clypeus convex, its anterior margin acutely arcuate, posterior bisinuate; the median segment with a rounded slope to its apex; the tibiæ of the legs smooth, the tarsi with minute spines on the inner side; abdomen subpetiolate. Clear shining metallic blue, the antennæ and legs dull black, the basal two-thirds of the posterior femora blood-red; the wings hyaline, the tegulæ and nervures piceous; beneath, the abdomen is black with only the basal segment blue, the head rather densely, the sides of the thorax and abdomen more lightly covered with silvery pile.

Hab. India, Burma, Ceylon, extending to Malacca, Borneo, and Celebes. ♀. *Length* 12–14; *exp.* 24–27 mm.

229. **Pseudagenia clypeata,** *Bingh. Jour. Linn. Soc.* 1896, p. 427.

♀. Pruinose; the head a little broader than the thorax; clypeus large and prominent, convex and transversely suboval; pronotum short, the anterior angles square, the posterior margin very slightly arched, almost transverse; median segment about as long as the rest of the thorax, rounded posteriorly, with a steep slope to its apex, obsoletely transversely striate, and bearing a central longitudinally impressed line; legs long, the tibiæ and tarsi with minute spines, almost smooth; abdomen short, petiolate, somewhat globular. Black, with a silvery pile very dense on the clypeus, sides of the face, and on the median segment; the clypeus with a

large white macula on each side, the anterior tibiæ and tarsi testaceous, the intermediate femora at apex, and the posterior femora except at the extreme base light orange-red; wings hyaline, brilliantly iridescent in certain lights, nervures and tegulæ testaceous. In some specimens the clypeus is entirely white.

♂ similar, but slighter and smaller, the anterior femora, tibiæ, and tarsi, and the intermediate and posterior femora completely light orange-red.

Hab. Burma; Tenasserim. ♀. *Length* 9–12; *exp.* 17–23 mm. ♂. *Length* 7–9; *exp.* 14–17 mm.

230. **Pseudagenia albilabris,** n. sp.

♂. Head, thorax, and abdomen pruinose; the clypeus large, convex, its anterior margin transverse and slightly waved; eyes convergent above; pronotum short, rounded, and very steep anteriorly: median segment long, rounded, with a gradual slope to the apex, and a central longitudinally impressed line, its anterior lobe deeply sulcated in the middle and obsoletely transversely striate; legs long, the tibiæ and tarsi smooth, the long calcaria of the hind tibiæ about half the length of the metatarsus; abdomen petiolate, fusiform, about as long as the head and thorax together. Black, with a thin silvery pile; the palpi, labrum, mandibles at apex, clypeus except an obscure spot in the centre, face to a little above the base of the antennæ in the middle and up to the vertex along the inner orbits of the eyes, the scape of the antennæ in front, the anterior coxæ in front, the femora, tibiæ, and tarsi, the posterior margins of segments 2–4 of the abdomen, with a large subtriangular macula on each side of the 6th, and the apical segment, yellowish white; the intermediate and posterior femora light orange-red, the tibiæ and tarsi dusky black; wings hyaline and iridescent, nervures and tegulæ testaceous.

Hab. Kumaun, N. India. ♂. *Length* 10; *exp.* 18 mm.

231. **Pseudagenia stulta,** *Bingh. Jour. Linn. Soc.* 1896, p. 428, ♀.

♀. Pruinose; head wider than the thorax, strongly convex anteriorly; clypeus narrow, transverse; pronotum very square in front, anteriorly almost emarginate, the lateral angles produced; the thorax in front finely punctured; the median segment rounded posteriorly, finely cribrate, its apex with an abbreviated, shallow, central, longitudinal furrow; legs with the tibiæ and tarsi minutely spined; abdomen petiolate, as long as the thorax, shining and somewhat aciculate. Black, the clypeus and front with glittering silvery pile; the coxæ, trochanters, femora, tibiæ, and tarsi of the anterior, and the coxæ, trochanters, and femora of the intermediate and posterior legs blood-red; wings hyaline and iridescent, the nervures and tegulæ testaceous.

Hab. Tenasserim. ♀. *Length* 11; *exp.* 26 mm.

232. **Pseudagenia tincta.**

Pompilus tinctus, *Smith, Cat.* iii, p. 145, ♀.
Agenia tincta, *Smith, Jour. Linn. Soc.* 1867, p. 354.
Agenia mutabilis, *Smith, Trans. Zool. Soc.* vii, 1870, p. 186, ♀.
Pseudagenia tincta, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 437, 441.
Pseudagenia mutabilis, *Cam. t. c.* p. 437.

♀. Pruinose; clypeus transversely oval, convex, its anterior margin boldly arched; pronotum short, its posterior margin widely arched; median segment broad, rounded, rather steep at apex, with a central longitudinally impressed line; legs smooth, the tibiæ and tarsi unarmed; abdomen distinctly petiolate, the petiole short. Black, with soft, thin, rather longish silvery white pile, most dense on the clypeus, the sides of the face, and apex of the median segment; the legs obscurely testaceous, the posterior femora except at apex pale red; posterior margins of the segments of the abdomen narrowly testaceous. The colour of the legs varies; in some specimens it is black with the posterior, or posterior and intermediate, or all the femora more or less red.

♂ similar; differs in having the median segment and the petiole of the abdomen comparatively much longer. Both sexes have the wings hyaline and iridescent, and the nervures and tegulæ testaceous.

Hab. North-West Provinces, Sikhim, and Barrackpore in India; Burma and Tenasserim. ♀. *Length* 9–11; *exp.* 14 mm. ♂. *Length* 7–9; *exp.* 14 mm.

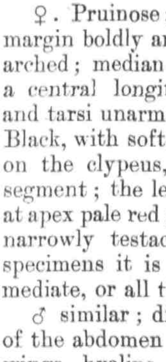

Fig. 27.—*Pseudagenia bipennis*, ♂. $\frac{2}{1}$.

233. **Pseudagenia bipennis.**

Agenia bipennis, *Sauss. Novara Reise, Hym.* p. 52, ♂.
Pseudagenia bipennis, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 436.

♂. Resembles *P. alaris*, Sauss., but is smaller and more slender; the head is not so wide in proportion to the thorax, and the anterior and intermediate coxæ in front, the labrum, apex of the mandibles, sides of the clypeus, and the inner orbits of the eyes are yellowish white, and the posterior femora dull orange-red.

Hab. Sikhim; Burma; Tenasserim; Ceylon. ♂. *Length* 9; *exp.* 17 mm.

234. **Pseudagenia hypsipyle,** *Bingh. Journ. Bomb. N. H. Soc.* 1893, p. 370.

Head, thorax in front, and abdomen pruinose, smooth but not shining; clypeus transverse, its anterior margin slightly arcuate, its posterior bisinuate; thorax long, the median segment transversely striate; the legs unarmed, almost smooth; abdomen sub-

petiolate. Black, the posterior femora red, the face in front, the sides of the thorax, and the median segment at apex covered with silvery pile; the base of the 1st to the 5th segments of the abdomen with lateral short broad bands of the same, only visible in certain lights; wings hyaline, iridescent, a faint fuscous fascia crossing the fore wing from the radial to the apex of the 2nd discoidal cell; nervures and tegulæ testaceous brown.

Hab. Sikhim; Tenasserim. ♀. *Length* 16; *exp.* 29 mm. ♂ smaller and slighter.

*235. **Pseudagenia veda**†, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 438, 440.

"Black, wings clear hyaline; a small fuscous cloud below and touching the stigma. Eyes a little converging, the hinder ocelli separated from each other by a very slightly less distance than they are from the eyes. Clypeus short, convex, the apex broadly rounded. Occiput slightly concave in the middle. The front strongly aciculate, the vertex shining, almost impunctate. The head except on the vertex densely covered with a silvery pubescence, the vertex with a few fuscous hairs; the lower and outer orbits with some long silvery ones. Pronotum shorter than the head, roundly narrowed towards the head, shallowly concave behind. Pro- and mesothorax alutaceous; the median segment with a rounded slope, irregularly transversely striated, deeply furrowed down the centre, the sides covered with long whitish hairs. Abdomen shining pruinose, having an olive tint, the petiole with a distinct neck. Radial cellule wide, angled where the cubital nervures are received; the 2nd cubital cellule at the top distinctly shorter than the 3rd, especially on the lower side; the 1st and 2nd transverse cubital nervures with a slight oblique curve; the 1st recurrent nervure is received a little beyond the middle; the 2nd at a less distance from the base. Legs densely covered with a silvery pile; the long spur of the hind tibiæ not much more than one-third of the length of the metatarsus; the front spurs pale, the front tarsi fuscous; the tibiæ with short spines; the metatarsal brush slight. This species differs from the others in having the basal nervure interstitial, but in other respects it agrees with the generic character.

"*Length* 7 mm."

Hab. Poona (*Wroughton*).

236. **Pseudagenia alaris.**

Agenia alaris, *Sauss. Novara Reise, Hym.* p. 52, ♀.

Pseudagenia alaris, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 436.

† This species was described by Mr. Cameron, from specimens in Mr. Wroughton's collection. In Mr. Rothney's collection there are two specimens of a *Pseudagenia* (which do not in any way differ from *P. tincta*), labelled *P. veda* in Mr. Cameron's writing. As neither corresponds to the published description of *veda*, I conclude the label has been attached to the two specimens by mistake.

♀. Pruinose; head wide, much wider than the thorax; clypeus transversely oval, convex, its anterior margin arched, and with a minute tooth in the middle; pronotum rounded anteriorly and abruptly narrowed towards the head; scutellum and post-scutellum prominent, compressed laterally in the middle; median segment long, obsoletely transversely striate, rounded, with a gradual slope to apex and an obscure shallow central longitudinal sulcation; legs very long and slender, the tibiæ and tarsi with minute spines; abdomen petiolate, fusiform, about the length of the thorax. Black, with a hoary pile, silvery in certain lights on the clypeus and sides of the face; wings hyaline and iridescent, obscurely yellow-tinted at base, a pale fuscous cloud occupies the base of the radial, the 2nd and 3rd cubital, and the apex of the 2nd discoidal cell; nervures and tegulæ testaceous.

♂ similar, but slighter and smaller.

Hab. Sikhim; Burma; Tenasserim; Ceylon. ♀. *Length* 11–14; *exp.* 18–21 mm. ♂. *Length* 8–10; *exp.* 18–20 mm.

237. **Pseudagenia lævicula**, n. sp.

♀. Head and thorax opaque, very slightly pruinose, abdomen smooth; clypeus subconvex, its anterior margin arched and with a minute tooth in the middle; pronotum short, rounded anteriorly; median segment long, posteriorly rounded, with a gradual slope to the apex and obscure fine transverse striations; legs with the tibiæ and tarsi very minutely spined, almost smooth; abdomen short, petiolate. Black, the clypeus, sides of the face, and sides of the median segment at apex with silvery pile; wings hyaline, iridescent, and with a fuscous cloud occupying the apex of the radial and descending into the apex of the 2nd discoidal cell.

♂ very similar, but with the femora, tibiæ, and tarsi of the anterior legs, and the intermediate and posterior femora light testaceous or orange-red, the calcaria of the intermediate tibiæ testaceous yellow, of the posterior tibiæ black.

Hab. Tenasserim. ♀. *Length* 7–8; *exp.* 13 mm. ♂. *Length* 6–7; *exp.* 13 mm.

238. **Pseudagenia micromegala.**

Agenia micromegas, *Sauss. Novara Reise, Hym.* p. 51, ♀, pl. iii, fig. 33.

Pseudagenia micromegas, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 437.

♀. Pruinose; head broader than long; thorax very broad; clypeus subconvex, its anterior margin arched, reflexed in the middle; thorax compressed, pronotum narrowed anteriorly, its posterior margin arched; median segment convexly declivous, with a central longitudinal sulcation; legs long, the tibial calcaria long; abdomen widely subfusiform. Black, with dense cinereous pile, the tarsi testaceous brown, the tibial calcaria light testaceous; the front with a rufescent spot in the sinus of the eyes; wings hyaline and

iridescent, with a narrow fuscous fascia along the basal nervure, and another broader one reaching from the base of the radial to the apex of the 2nd discoidal cell.

Hab. Ceylon. ♀. *Length* 6; *exp.* 10 mm.

239. **Pseudagenia callisto.**

Agenia callisto, *Smith, Jour. Linn. Soc.* 1859, p. 154, ♀.

♀. Closely resembles *P. alaris*, Sauss., but is more densely covered with silvery pile, which on the abdomen has a tesselated appearance; the median segment is more markedly transversely striate and not sulcated, and the fore wing is crossed by two dark fuscous clouds—one narrow, along the basal nervure, the other much broader, from the base of the radial to the apex of the 2nd discoidal cell.

♂ similar, but the intermediate and posterior femora and the base of the abdomen are obscurely orange-red, and the anterior tarsi with the calcaria of the intermediate and posterior tibiæ testaceous yellow.

Hab. Tenasserim; Sumatra; Aru Islands; probably extending throughout the Malayan region. ♀. *Length* 14–17; *exp.* 28–31 mm. ♂. *Length* 11; *exp.* 26 mm.

240. **Pseudagenia acricula,** n. sp.

♀. Head, thorax in front, and abdomen smooth, somewhat shining; median segment coarsely transversely rugose, almost cribrate; clypeus transverse, slightly convex; antennæ with the joints of the flagellum constricted at their bases; median segment short, rounded, with a steep slope at apex, where there is a central shallow longitudinal sulcation; legs rather stout, the tibiæ and tarsi very feebly spinose; abdomen petiolate. Black, the scape and basal six or seven joints of the flagellum of the antennæ dusky red; the anterior femora, tibiæ, and basal joint of the tarsi, and the intermediate and posterior coxæ, trochanters, and femora red: wings hyaline, the stigma jet-black, a broad fuscous cloud or bar with the sides sharply and evenly defined occupies the basal three-fourths of the radial cell and descends obliquely outwards through the 2nd and 3rd cubital to the 2nd and 3rd discoidal cells; the basal nervure in the fore wing is also shaded narrowly on both sides with fuscous.

Hab. Tenasserim. ♀. *Length* 7; *exp.* 15 mm.

241. **Pseudagenia erigone,** *Bingh. Jour. Linn. Soc.* 1896, p. 426.

♀. Head and thorax rugose, abdomen smooth and shining, head and pronotum very closely and finely punctured; mesonotum, scutellum, and postscutellum longitudinally, the median segment transversely, and the pleuræ obliquely striate, the striæ very fine on the mesonotum and pleuræ, and coarse on the scutellum, post-scutellum, and median segment; legs smooth, with very minute

spines on the tibiæ and on the tarsi beneath; abdomen petiolate. Black, the head, pro- and mesonotum, and median segment dull and opaque, the scutellum and abdomen shining; the opaque parts covered with an almost imperceptible sparse silvery pile: wings hyaline, with two fuscous transverse fasciæ—the first broad, along the basal nervure, and reaching from the costal to the posterior margin of the fore wing; the second narrower, occupying the basal angle of the radial and the apex of the 2nd cubital cell.

Hab. The Karen Hills, Tenasserim. ♀. *Length* 13; *exp.* 27 mm.

242. **Pseudagenia ægina.**

Agenia ægina, *Smith, Jour. Linn. Soc.* 1858, p. 94, ♀; *idem*, 1867, p. 355.

Pseudagenia ægina, *Cam. Mem. Manch. L. Ph. Soc.* (4) v, 1891, p. 436.

♀ ♂. Head and abdomen smooth, thorax finely rugose; clypeus large, convex, orbicular, its anterior margin toothed in the middle; pronotum, mesonotum, and scutellum with very fine punctures; median segment long, abruptly rounded posteriorly and transversely striate; legs long, armed with a few short feeble spines; abdomen subpetiolate. Head, legs, and abdomen black, thorax blood-red wings hyaline, with in the fore wing a shading of fuscous on both sides of the basal nervure, and an irregular transverse fuscous spot beyond, occupying the basal two-thirds of the radial, the 2nd and 3rd cubital cells, and extending into the 2nd and 3rd (incomplete) discoidal cells.

Hab. India; Burma; Tenasserim; Ceylon; Borneo. ♀. *Length* 10; *exp.* 24 mm. ♂ slighter and much smaller.

243. **Pseudagenia rava,** *Bingh. Jour. Linn. Soc.* 1896, p. 426.

♀. Pruinose; the head in front and on the vertex, the pronotum and mesonotum strongly aciculate; the clypeus convex, its anterior margin rounded and toothed in the middle; a short, deeply impressed line between the bases of the antennæ, the latter stout, convolute; the head posteriorly concave, the pronotum square, the anterior angles prominent; the median segment bulging, prominent, lightly transversely striate, the apex rounded and steeply sloped, almost truncate; legs stout, the tibiæ and tarsi slightly spinose; abdomen subpetiolate, long, as long as the thorax, and slightly curved. Black, the clypeus and face with dense silvery pile, the anterior margin of the clypeus fringed with long black hairs; the posterior margins of abdominal segments 1–4 with broad bands of silvery pile, produced on the 2nd and 3rd segments angularly forward in the middle; wings flavo-

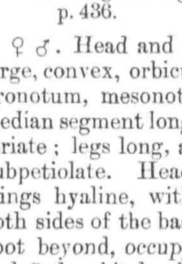

Fig. 28.
Pseudagenia rava, ♀. 1/1.

hyaline, the apical margins from the middle of the radial cell in the fore wing lightly fuscous; nervures and tegulæ testaceous.

Hab. Bangalore, S. India. ♀. *Length* 10–12; *exp.* 18–21 mm.

***244. Pseudagenia nana.**

Agenia nana, *Sauss. Novara Reise, Hym.* p. 55, ♀.
Pseudagenia nana, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 438.

♀. Small and slender; the head a little wider than the thorax, the eyes convergent above; pronotum posteriorly angular; scutellum subconvex; median segment posteriorly rounded, the apex vertically truncate, with an obscure furrow; legs slightly spinose, the anterior tarsi pectinate. Black with greyish-white pile, the head in front, thorax beneath and on the sides with silvery pile; the posterior margin of the pronotum, a spot at the base of the posterior tibiæ above, and the tibial calcaria white; the apex of the abdomen fuscescent; wings hyaline, the apex lightly fuscous, the nervures subfuscous.

Hab. Ceylon. ♀. *Length* 8; *exp.* 15 mm.

This species is unknown to me, but, from the fact that the anterior tarsi are said to be pectinated, I should say it is more likely to be a *Pompilus* than a *Pseudagenia.*

245. Pseudagenia juno.

Salius juno, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 451, 456.

♀. Head, thorax, and abdomen smooth, opaque; clypeus slightly convex, much broader than high, anteriorly rounded and produced into a tooth in the middle; head broader than the thorax, eyes converging above; pronotum rather long, square anteriorly, with the anterior lateral angles a little produced, posterior margin angular; median segment long, with a rather steep slope to the apex, posteriorly rounded and lightly transversely striate; legs long, the tibiæ smooth, slightly pruinose, the tarsi with minute spines; abdomen petiolate, suddenly widened beyond the petiole, subglobular. Black, the clypeus, front, and coxæ of the legs anteriorly with silvery pile; the abdomen red, the base of the petiole black: wings hyaline, apex of the fore wing broadly fuscous; the nervures, tegulæ, the knees, and front tarsi testaceous.

Hab. Barrackpore, Bengal. ♀. *Length* 8; *exp.* 15 mm.

Resembles *P. pedunculata*, Smith, but that has the pronotum anteriorly narrowed, not square, and posteriorly arched, not angular.

246. Pseudagenia cærulea.

Pompilus cæruleus, *Smith, Cat.* iii, p. 147, ♀.
Agenia cærulea, *Smith, Jour. Linn. Soc.* 1867, p. 355.
Pseudagenia cærulea, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 436, 438.

♀. Head, mesonotum, scutellum, and sides of the thorax finely punctured, the pronotum anteriorly with scattered distant

punctures; median segment rounded posteriorly with a steep slope to its apex, and transversely striate and rugose, a shallow sulcation down the middle, with a longitudinally impressed line on each side close to the stigmata; legs long, armed with only very minute spines; abdomen subpetiolate, smooth and shining. Deep shining metallic blue with shades of green in certain lights; antennæ and tarsi opaque black: wings hyaline, some fuscous shading along the basal nervure of fore wing and in the 2nd cubital and discoidal cells; nervures and tegulæ testaceous brown.

Hab. India (Bengal); Sumatra. ♀. *Length* 11–15; *exp.* 27–31 mm. ♂ unknown.

Genus **SALIUS**.

Salius, pt., *Fabr. Syst. Piez.* p. 124 (1804).
Priocnemis, pt., *Schiödte, Mon. Pomp., Kröyer's Tidsskr.* 1837, p. 321.
Hemipepsis, pt.; Priocnemis, pt.; Cyphononyx, pt.; Homonotus, pt.; et Entypus, pt., *Dahlb. Hym. Eur.* i, p. 440 *et seq.* (1845).
Pallosoma, pt., *Lepel. Hym.* iii (1845) p. 492.
Mygnimia, pt., *Smith, Cat.* iii (1855) p. 181.
Salius, *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 43.

Type, *S. bicolor*, Fabr.
Range. Over both hemispheres.

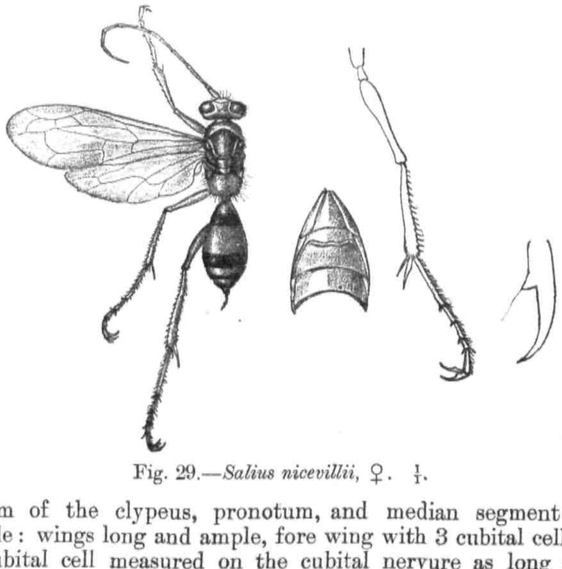

Fig. 29.—*Salius nicevillii*, ♀. $\frac{1}{1}$.

Form of the clypeus, pronotum, and median segment very variable: wings long and ample, fore wing with 3 cubital cells, the 3rd cubital cell measured on the cubital nervure as long as or longer than the 2nd cubital cell, the latter receives the 1st recurrent nervure after the middle of the cell, and in one group (*Mygnimia*, Smith) at the extreme apex, interstitial with the 2nd transverse cubital nervure; the 3rd cubital cell receives the 2nd

recurrent nervure before the middle ; the basal or transverse medial nervure takes its rise before the apex of the 1st submedial cell, the cubital nervure stops short of the margin of the wing, and the discoidal nervure reaches, ordinarily, up to it; in many species a hyaline discoidal spot is present, conspicuous when the wing is of a dark shade; in the hind wing the cubital nervure originates, as a rule, just before the apex of the anal cell. Legs very long, the apex of the posterior tibia, when the legs are stretched, reaching well beyond the apex of the abdomen (♀); the armature of the legs varies, but generally is well developed; the anterior tarsi are ciliated on the outside, the posterior tibiæ are angular or sub-angular, never quite cylindrical, in most of the species grooved, spined, and serrated, very often strongly so; claws with one or more erect teeth on their under margins, or bifid. Abdomen pseudo-sessile, the 2nd ventral segment with a transverse impressed line or groove, as a rule well-marked in the female, nearly obsolete and difficult of detection in the male.

Very little is known of the habits of the species belonging to this genus, which contains some of the largest forms of Hymenoptera in the World. Some, like *Pompilus*, make their nests in the ground, digging these themselves, and providing spiders as food for their broods; others make use of holes in trees, and provision their nests with cockroaches, or, like the *Larridæ*, with crickets.

Key to the Species.

A. Tarsal claws bidentate.
- *a*. Wings some shade of fulvous yellow.
  - a'. Head and thorax black.
    - a^2. Wings a peculiar oily fuscous yellow .... *S. anthracinus*, p. 126.
    - b^2. Wings broadly infuscate at base and apical margin.
      - a^3. Fore wing with the apical margin infuscate up to the base of the 2nd cubital cell .... *S. satelles*, p. 127.
      - b^3. Fore wing with the apical margin infuscate only up to apex of the 3rd cubital cell .. *S. bellicosus*, p. 127.
  - b'. Head and thorax ferruginous, with ferruginous pile, or fulvous red.
    - *a* . Abdomen black.
      - a^3. Median segment ferruginous .. *S. aureosericeus*, p. 127.
      - b^3. Median segment black.
        - a^4. Apical margins of the wings pale .... *S. ceylonicus*, p. 128.
        - b^4. Apical margin of fore wing fuscous.
          - a^5. Median segment posteriorly rounded, with a gentle slope to the apex .... *S. fulvipennis*, p. 129.
          - b^5. Median segment posteriorly with a steep slope, almost truncate .... *S. perplexus*, p. 130.

b^2. Abdomen fulvous red.
- a^3. The abdominal segments above with broad transverse black bands .... *S. fenestratus* (var.) [p. 132.
- b^3. The abdominal segments entirely fulvous red .... *S. rubidus*, p. 130.

c^2. Abdomen dull ferruginous yellow. *S. ichneumoneus*, p. 130.

c'. Head and thorax obscure blackish castaneous; clypeus, antennæ, and legs below femora with golden ferruginous pile .... *S. sycophanta*, p. 131.

b. Wings fuscous or fuscous black, with a purple effulgence.
- a'. Fore wing with a large subovate spot of silvery pile on the disc .... *S. ducalis*, p. 131.
- b'. Wings immaculate.
  - a^2. Abdomen black .... *S. cæruleopennis*, p. 132.
  - b^2. Abdomen red, or fulvous or ferruginous red.
    - a^3. The abdominal segments above marked with broad transverse black bands .... *S. fenestratus*, p. 132.
    - b^3. The abdominal segments without transverse bands.
      - a^4. Basal two segments of abdomen black .... *S. veda*, p. 133.
      - b^4. Only basal segment of abdomen black.
        - a^5. Head and antennæ fulvous or ferruginous, with ferruginous or golden pile .... *S. sinensis*, p. 133.
        - b^5. Head black; antennæ only ferruginous or yellow .... *S. indicus*, p. 134.
      - c^4. The entire abdomen ferruginous red, only the extreme base narrowly black .... *S. smithii*, p. 134.

B. Tarsal claws unidentate or bifid.

a. Wings fuscous, fuscous brown or black, with generally a brilliant purple-blue or green effulgence.
- a'. Head beneath bituberculate .... *S. tuberculatus*, p. 135.
- b'. Head normal, not tuberculate beneath.
  - a^2. Fore wing variegated with yellow hyaline spots .... *S. zelotypus*, p. 135.
  - b^2. Fore wing with an irregular yellow hyaline patch or bar on the disc .... *S. venatorius*, p. 136.
  - c^2. Fore wing with a portion of the 1st discoidal and 2nd submedial cells clear hyaline .... *S. placidus*, p. 136.
  - d^2. Both wings entirely fuscous or fuscous brown.
    - a^3. Head, thorax, and abdomen fulvous red, the last with transparent black bars .... *S. nicevillii* (var.), p. 141.

b^3. Head and fore part of the thorax with ferruginous golden pubescence.
- a^4. Abdomen entirely black.
  - a^5. Median segment transversely striate. L. 15–18 mm. . . *S. præstabilis*, p. 136.
  - b^5. Median segment not transversely striate. L. 12 mm. *S. acer*, p. 137.
- b^4. Abdomen with one or more of the apical segments studded with golden ferruginous hairs.
  - a^5. Apical segment only with ferruginous hairs; claws bifid . . . . *S. bipartitus*, p. 137.
  - b^5. Apical two or three segments with ferruginous or golden pubescence; claws with an erect tooth at base below, not bifid . . . . *S. consanguineus*, p. 138.

c^3. Head and fore part of the thorax with black pubescence.
- a^4. Wings with magnificent purple, coppery, and roseate tints. Antennæ (♂) not ciliated . . *S. fulgidipennis*, p. 138.
- b^4. Wings with brilliant green tints. Antennæ (♂) ciliated. *S. iridipennis*, p. 139.
- c^4. Wings with dark purplish tints, not very effulgent. Antennæ (♂) not ciliated.
  - a^5. Fore *tibiæ* and *tarsi* and the antennæ black . . . . . . *S. madraspatanus*, p. 139.
  - b^5. Fore tibiæ and tarsi and the antennæ beneath fulvous brown . . . . *S. mirandus*, p. 139.

d^3. Head, thorax, and abdomen with cinerous silvery pile; wings (especially the hind wing) light fusco-hyaline . . . . *S. properus*, p. 140.

b. Wings yellow, or brownish or reddish yellow.
- *a'*. Head, thorax, and abdomen covered more or less with longish golden pubescence.
  - a^2. Wings light flavo-hyaline, without a discoidal spot . . . . *S. crinitus*, p. 140.
  - b^2. Wings light brownish, with a distinct discoidal spot . . . . *S. exilipes*, p. 141.
- *b'*. Head and thorax covered with short velvety pile; abdomen smooth and shining or opaquely pilose, never pubescent.
  - a^2. Head, thorax, and abdomen red or brownish red, the last with black transverse bars.
    - a^3. Of comparatively large size

(♀. L. 24–30 mm.). Wings deep fulvous red, apical margin lightly fuscescent........... *S. nicevillii*, p. 141.

b^3. Smaller (♀. L. 20 mm.). Wings pale oily brown; fore wing with a faint fuscous subapical cloud. *S. terrenus*, p. 141.

b^2. Head and fore part of thorax fulvous or ferruginous yellow, with golden pile.

a^3. Of robust build; median segment coarsely transversely striate .. *S. flavus*, p. 142.

b^3. Of slighter build; median segment finely reticulate .... *S. grassator*, p. 143.

c^2. Head and the whole of the thorax fulvous or ferruginous yellow, covered, as is the abdomen also, with a thin silky golden pile.... *S. sericosoma*, p. 143.

d^2. Head, thorax, and abdomen black, the head and thorax variegated with yellow markings .... *S. verticalis*, p. 144.

c. Wings clear hyaline.

a'. Abdomen entirely black, with bands of cinereous silvery pile .... *S. momus*, p. 144.

b'. Abdomen entirely yellowish red, the extreme base only black .... *S. obsonator*, p. 144.

c'. Abdomen with the basal half red, the apical half black.

a^2. Median segment above coarsely reticulate. ♀. L. 16 mm. .... *S. valentulus*, p. 145.

b^2. Median segment above finely transversely striate; slighter and smaller. ♀. L. 12 mm. ...... *S. geminus*, p. 145.

d. Wings hyaline, fore wing with fuscous fasciæ or clouds.

a'. Abdomen with basal half red, apical half black...................... *S. electus*, p. 146.

b'. Abdomen entirely black; front above base of antennæ with two parallel carinæ and a shining fovea between them........................ *S. rothneyi*, p. 146.

c'. Abdomen entirely black; front not carinated, a shining fovea only present .... *S. cotesi*, p. 146.

247. **Salius anthracinus.**

Mygnimia anthracina, *Smith, Cat.* iii, p. 183, ♂.
Salius anthracina, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 442, 447.

♀. Clypeus smooth, the rest of the head, the thorax, and abdomen pruinose; the median segment at base depressed suddenly and markedly below the postscutellum, and roughly transversely striate; the legs long and slender; the intermediate and posterior tibiæ and tarsi spinose, the posterior tibiæ serrated; abdomen subpetiolate, somewhat fusiform. Deep velvety black, the clypeus alutaceous; the apical three joints of the tarsi

testaceous brown; wings fusco-hyaline, with an oily yellow tinge, the base and the apex broadly dark fuscous.

♂ similar, but with the disc of the wings covered with a fine short silvery-white sericeous pile.

Hab. Sylhet; Sikhim; Borneo; Java; Sumatra. ♀. *Length* 29; *exp.* 62 mm. ♂. *Length* 26; *exp.* 60 mm.

248. **Salius satelles,** *Bingh. Jour. Linn. Soc.* 1896, p. 433.

♂. Pruinose; the clypeus small, convex, its anterior margin almost transverse in the middle and slightly incurved; the mesonotum broad, subconvex, slightly aciculate; scutellum and postscutellum raised in the middle, very prominent, the latter forming a tubercle; median segment long, somewhat truncate at apex, transversely striated, longitudinally sulcate on each side of a median line, the sides slightly raised, and ending at the apex in well-marked but blunt projections; legs long and slender, the tibiæ and tarsi feebly spinose; abdomen short, vertically compressed, the ventral furrow on the 2nd segment feebly indicated. Intensely black, the clypeus alutaceous, the underside of the antennæ slightly fulvous; wings fuscous, with a broad hyaline yellow transverse bar across the disc in the fore wing, extending from the apical half of the basal cell to a little beyond the base of the 2nd cubital and 2nd discoidal cells; nervures fuscous black, yellow on the hyaline portion of the wing; tegulæ black.

Hab. Tenasserim. ♂. *Length* 22; *exp.* 52 mm.

249. **Salius bellicosus.** (Pl. I, fig. 5.)

Mygnimia bellicosa, *Smith, A. M. N. H.* (4) xii, 1873, p. 256.
Salius belicosus, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 443.
Salius hercules, *Cam. t. c.* pp. 444 & 447, ♂.

♀. Closely resembles *S. sycophanta*, Gribodo, but is smaller, has the pronotum shorter, and the median segment longer in proportion; the abdomen smooth and shining, and more petiolate, and the wings dark fuscous at base up to or a little beyond the basal nervure, then deep flavo-hyaline, with the apex fuscous. The male has the antennæ fuscous above for half their length from base, and the legs darker than in the female.

Var. ♀. With the fuscous colour in the basal portion of the fore wing not quite reaching up to the basal nervure.

Hab. Bengal; Nága Hills; Pegu Hills, Burma; Tenasserim. ♀. *Length* 35–42; *exp.* 64–82 mm. ♂. *Length* 26–34; *exp.* 56–67 mm. Mr. Cameron's minute description of *S. hercules* compared with the type of *S. bellicosus*, Smith, in the British Museum, leaves no doubt as to the identity of the two.

250. **Salius aureosericeus.**

Pompilus aureosericus, *Guér. Voy. Coq., Zool.* ii, pt. 2, p. 256.
Mygnimia aureosericea, *Smith, Cat.* iii, p. 182.
Salius aureosericea, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 443.

Salius elizabethæ, *Bingh. Jour. Bomb. N. H. Soc.* viii, 1893, p. 372, ♀ ♂, pl. i, fig. 9, ♀.

♀. Head, thorax, and abdomen densely pruinose; the clypeus broad, slightly convex, its anterior margin truncate in the middle, front above the base of the antennæ with a broad, shallow sulcation and an abbreviated impressed perpendicular line down its middle; median segment depressed, at base below the postscutellum rounded and roughly transversely striate, its apex abruptly truncate, the truncation smooth; legs long, the tibiæ and tarsi spinose, the posterior tibiæ serrated; the abdomen broadly fusiform. Head, thorax, and legs ferruginous red, covered on the head, pro- and mesothorax with dense, and on the median segment and legs with more scanty silky golden pile; abdomen black, with velvety black pile, the apical two segments with reddish golden pile; wings ferruginous yellow, with the apex and posterior margin palely fuscescent.

Fig. 30.
Salius aureosericeus, ♂. ½.

♂ similar, but the median segment is rounded with a regular slope to the apex, the antennæ are subfusiform, and the abdomen somewhat vertically compressed. A variety (*elizabethæ*) has the abdomen entirely black.

Hab. S. India; Tenasserim; Java. ♀. *Length* 28–52; *exp.* 60–84 mm. ♂. *Length* 17–38; *exp.* 44–80 mm.

Note.—I suspect *P. gigas*, Taschenberg (Zeitsch. für d. Ges. Naturwiss. 1869, p. 40) is only a variety of this puzzling species, which affords a good example of the impossibility of separating the genus *Mygnimia*, Shuck. & Smith = *Hemipepsis*, Dahlbom, from *Priocnemis*, Schiödte. Out of a series of over 70 specimens that I have examined, 40 have the *Mygnimia* venation, and more than 30 that of the genus *Priocnemis*; but then all the latter have the bidentate claws to the tarsic haracteristic of *Mygnimia*, and are absolutely identical in sculpture and colouring with the former.

251. Salius ceylonicus.

? Hemipepsis flava, *Dahlb. Hym. Eur.* i, p. 462, ♀ var. (*nec* Priocnemis flavus, *Dahlb. t. c.* p. 457).

Mygnimia ceylonica, *Sauss. Novara Reise, Hym.* p. 64, ♀ (1867).

Mygnimia intermedia, *Smith, A. M. N. H.* (4) xii, 1873, p. 257.

Priocnemis convexus, *Bingh. Jour. Bomb. N. H. Soc.* v, 1890, p. 237, ♀ var.?

Salius ceylonicus, et intermedius, et convexus, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 443, 444, & 451.

Salius intermedius et convexus, *Bingh. Jour. Bomb. N. H. Soc.* x, 1896, p. 215, nos. 3 & 4, pl. ii, figs. 3 & 4.

♀. Head, thorax in front, and abdomen pruinose; median segment transversely striate; clypeus broader than high, slightly convex, its anterior margin transverse, or widely but not deeply emarginate; pronotum square, almost transverse in front, with the anterior lateral angles somewhat produced, posteriorly arched; median segment with a gradual slope, the apex abruptly truncate, the face of the truncation smooth and shining; legs robust, long, the tibiæ and tarsi spinose, the posterior tibiæ grooved but not serrated; abdomen pseudosessile, robust, fusiform and somewhat curved. Head, pronotum, mesonotum, scutellum, postscutellum, the coxæ in front, the femora, tibiæ, and tarsi of the anterior legs, and the femora, tibiæ, and tarsi of the two posterior pair fulvous red; the head, pro- and mesonotum, and scutellum clothed with a dense golden pile; the median segment, the anterior coxæ at the back, the coxæ of the intermediate and posterior legs, and the abdomen black, the last with a velvety black pile having gleams of golden brown in certain lights; wings broad, from pale flavo-hyaline to deep fulvo-hyaline, the apical margins paler, the nervures and tegulæ fulvous red.

♂ similar, but slighter and smaller, with porrect antennæ.

Hab. Sikhim; Burma; Tenasserim; and Ceylon. ♀. *Length* 20–35; *exp.* 38–64 mm. ♂. *Length* 18–28; *exp.* 39–53 mm. A very variable insect as to size.

252. **Salius fulvipennis.**

Sphex fulvipennis, *Fabr. Ent. Syst.* ii, p. 218.
Pompilus fulvipennis, *Fabr. Syst. Piez.* p. 198; *Smith, Cat.* iii, p. 144; *Sauss. Novara Reise, Hym.* p. 58, ♀ ♂.
Hemipepsis fulvipennis, *Dahlb. Hym. Eur.* i, p. 462.
Salius fulvipennis, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 444.

♀. Head and thorax in front pruinose, median segment transversely striate, abdomen smooth and shining; clypeus convex, its anterior margin transverse in the middle, oblique at the sides; front with a short obsolete vertically impressed line, eyes slightly convergent above; pronotum short, somewhat square anteriorly, its posterior margin widely arched; median segment rather long, posteriorly rounded, with a gentle slope to the apex; legs long, the tibiæ and tarsi spinose, the posterior tibiæ slightly serrate; abdomen pseudosessile, fusiform, as long as the head and thorax together, apical segment studded with stiff hairs. Head, pro- and mesonotum, scutellum, postscutellum, apical half of the femora, the tibiæ and tarsi, and the apex of the abdomen reddish yellow, the head, pro- and mesonotum covered with a dense short golden pile; the thorax beneath, the median, segment, the coxæ, trochanters, and basal half of the femora, and the abdomen except at apex, black, with iridescent tints on the abdomen in certain lights; wings flavo-ferruginous, the apex of the fore wing and apex and narrow posterior margin of the hind wing fuscescent.

♂ similar, but slighter, and with the antennæ porrect. Varies in having the sides of the pro- and mesonotum blackish, and in a

specimen from the Andamans the apical three segments are reddish yellow.

Hab. Throughout India; Burma; Ceylon; the Andamans. ♀. *Length* 20–24; *exp.* 39–43 mm. ♂. *Length* 20–21; *exp.* 37–40 mm.

253. **Salius perplexus.**

Mygnimia perplexa, *Smith, Cat.* iii, p. 185, ♀.

♀. Head and thorax in front pruinose, median segment rugose, abdomen smooth and shining; clypeus convex, wedge-shaped, slightly emarginate anteriorly in the middle, the sides rounded; thorax compact, stout; median segment transversely striate, short, with an abrupt slope at the apex, almost truncate; legs stout, the tibiæ and tarsi spinose, the posterior tibiæ strongly serrate; abdomen sessile, thick at base and sharply tapering to the apex, the apical segment studded with stiff hairs. Head, pro- and mesonotum, scutellum, postscutellum, apical two-thirds of the femora, the tibiæ and tarsi ferruginous; the head, pro- and mesonotum with a thick ferruginous pile; the sides of the thorax, the pectus, median segment, coxæ, and base of the femora, and the abdomen black, the last with a little ferruginous pile on the apical segment; wings ferruginous, the apical margin of fore wing broadly and darkly, and of the hind wing narrowly and lightly fuscous.

Hab. Sikhim; S. India; Tenasserim. ♀. *Length* 26–31; *exp.* 48–52 mm. ♂ somewhat slighter and smaller.

254. **Salius rubidus.**

Mygnimia rubida, *Bingh. Jour. Bomb. N. H. Soc.* v, 1890, p. 238, ♀ ♂.
Salius rubida, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 445.
Salius rubidus, *Bingh. P. Z. S.* 1896, p. 435, pl. xv, fig. 2.

♀. Head and thorax densely pruinose, abdomen smooth and shining; head about as wide as the thorax; clypeus convex, anteriorly widely emarginate, and studded with long hairs; front subconcave, eyes convergent above; pronotum short, transverse in front, broadly arched posteriorly; median segment long, with a rather steep slope, and abruptly truncate at apex, transversely and coarsely striate; legs long, strongly spinose, the posterior tibiæ serrate; abdomen subfusiform, petiolate, about as long as the thorax. Fulvous golden red all over, the scattered pubescence and thick pile with bright golden tints, the apical margins of segments 1–5 obscurely dusky red, the apex studded with stiff golden hairs; wings rich fulvous red, the apical margins narrowly fuscescent, nervures and tegulæ fulvous red.

♂ similar but smaller, and the antennæ porrect and thick.

Hab. Ceylon. ♀. *Length* 21–35; *exp.* 48–66 mm. ♂. *Length* 14; *exp.* 27 mm.

255. **Salius ichneumoneus.**

Pompilus ichneumoneus, *Guér. Voy. Coq., Zool.* pt. 2, p. 258, ♀, *Atlas, Ins.* no. 8. fig. 13; *Smith, Cat.* iii, p. 151.

? Mygnimia ichneumoniformis, *Smith, Jour. Linn. Soc.* vi (1862), p. 55; *idem*, xi (1867), p. 358.

♂. Head and thorax pruinose, abdomen finely longitudinally aciculate; clypeus transversely convex, its anterior margin slightly arched; front concave, with a medial vertically impressed line; pronotum rounded in front, arched posteriorly; scutellum and postscutellum laterally compressed; median segment rounded above and coarsely transversely striate, posteriorly truncate, face of truncation smooth; abdomen vertically flattened, longer than the head and thorax together. A rich ferruginous brown, with two parallel longitudinal black stripes on the mesonotum, and some indistinct black marks on the basal two segments of the abdomen above; the clypeus, the coxæ and femora of the legs, and the apical three segments of the abdomen with dense ferruginous pile; wings ferruginous brown, nervures and tegulæ ferruginous.

Hab. New Guinea; Ceram; Amboyna; and, within our limits, Sikhim; Sylhet. In Smith's Catalogue, Brazil is given as a locality, but there is no doubt this is a mistake. ♂. *Length* 20–24; *exp.* 42–46 mm. Guérin's description of the ♀, of which I have not seen a specimen, corresponds well with the above; he gives the length as 22 mm.

256. **Salius sycophanta.**

Hemipepsis sycophanta, *Gribodo, Ann. Mus. Civ. Gen.* (2ª) i, 1884, p. 359, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 480.
Salius severus, *Bingh. Jour. Bomb. N. H. Soc.* viii, 1893, p. 371; *id.* x, 1896, p. 215, pl. ii, fig. 2, ♀ (*nec* Sphex severus, *Drury, Ill. Exot. Ins.* iii, t. 42, fig. 4).

♀. Head and thorax densely pruinose; abdomen smooth and shining, in certain lights with a slight pruinose bloom, having the appearance of fine longitudinal aciculate striæ; clypeus slightly convex, broader than high, posteriorly triemarginate, anterior margin transverse, oblique at the sides; median segment subcylindrical, somewhat truncate posteriorly, the truncation with a projecting margin which is lightly waved; above, the median segment is irregularly and deeply striate, the pleuræ smooth; abdomen pseudosessile. Black with a castaneous hue; the clypeus, antennæ, apex of the femora, the tibiæ and tarsi of the legs with dense golden ferruginous pile; wings deep reddish yellow, infuscate at base and more narrowly at apex.

Var.? "With the head, the prothorax, the tegulæ, and scutellum fusco-fulvous; antennæ yellow. ♀. Length 28 millim." (*Gribodo.*)

Hab. Southern India; Ceylon?; Burma; Tenasserim. ♀. *Length* 42–52; *exp.* 80–96 mm. ♂ unknown.

Note.—Salius (*Sphex*) *severus*, Drury, must be removed from the Indian list; it is an African species.

257. **Salius ducalis.**

Mygnimia ducalis, *Smith, Jour. Linn. Soc.* 1858, p. 98, ♀.
Salius ducalis, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 443.

♀. Head, thorax, and abdomen pruinose; clypeus broad, convex, wedge-shaped, the anterior margin slightly emarginate, the sides oblique, the forehead below the ocelli markedly sulcate; median segment long, coarsely transversely striate, the apex abruptly truncate, the face of the truncation smooth and shining; legs long, robust, the tibiæ and tarsi stoutly spined; abdomen pseudosessile, broad and stout, about as long as the head and thorax together. Intensely black, the abdomen with a violet and purple gloss; wings dark fuscous with a purple effulgence, and a large subovate patch of glittering minute silvery scales on the disc of the fore wing.

♂ similar, smaller, more slender, the abdomen vertically compressed; the front of the head, the scutellum, and postscutellum alutaceous, the last tuberculate.

Hab. India; Siam; Borneo. ♀. *Length* 42; *exp.* 82 mm. ♂. *Length* 26; *exp.* 60 mm.

*258. **Salius cæruleopennis.**

Mygnimia cæruleopennis, *Sauss. Mitth. Schweiz. ent. Ges.* viii, 1893, p. 269, ♀.

♀. "Black, of slender form; the antennæ, head, pronotum, scutellum, legs, and apical two segments of the abdomen golden yellow, or fulvous red with golden pile; the anterior margin of the clypeus transverse and somewhat reflexed; metathorax truncate and markedly transversely striate; the posterior tibiæ carinated, the carinæ along their whole length studded with two rows of serrate spines; wings black with a blue effulgence."

Hab. India. ♀. *Length* 22 mm. Unknown to me, but from the description I should say closely allied to *S. consanguineus*, Sauss., which, however, belongs to the group with unidentate claws (*Priocnemis*).

259. **Salius fenestratus.**

Mygnimia audax, *Smith, Cat.* iii, p. 182, ♀ (*nec* Pompilus audax, *Smith, Cat.* iii, p. 136).
Mygnimia fenestrata, *Smith, Cat.* iii, p. 184, ♂.
Salius audax, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 442.
Salius funestus, *Cam. t. c.* p. 444.

♀. Head and thorax pruinose, abdomen smooth and shining; clypeus transverse, convex, its anterior margin truncate or subemarginate in the middle, the front of the face concave, bearing a deeply impressed line from the anterior ocellus to between the base of the antennæ, and a shallow broad sulcation on each side of it; median segment long, posteriorly with a gradual slope to the apex, which is abruptly truncate, the sides and above with coarse transverse striations, the truncation smooth without striæ; legs long, robust, spinose, the posterior tibiæ serrate; abdomen as long as the head and thorax together, massive, somewhat curved. Deep ferruginous red, the pile on the head and thorax dense and velvety with a glistening golden sheen; the extreme

base of the abdomen and the apical margins of segments 1–4 above and below broadly black, these bands on the upperside produced angularly forward in the middle; wings deep ferruginous red, fuscescent towards the apex and narrowly along the posterior margin. In certain lights there is a purple iridescence at the base of the wing in fresh specimens.

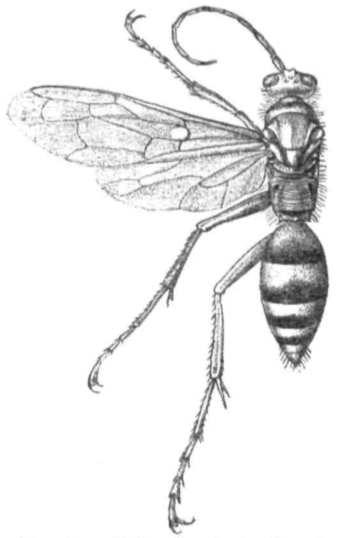

Fig. 31.—*Salius fenestratus*, ♀. ¾.

The ♂ is similar but of slighter build, with the wings lighter in colour. There are two varieties of this insect—the typical one (*audax* of Smith), with the wings coloured as above; and another (*fenestrata*, Smith, *funestus*, Cameron), with the wings of a deep brown, having a rich purple effulgence.

Hab. Sylhet; Sikhim at low elevations; Dawnat Range, Tenasserim. ♀. *Length* 32–41; *exp.* 66–84 mm. ♂. *Length* 27–31; *exp.* 60–70 mm.

260. **Salius veda**, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 445 & 449.

Head and thorax bearing a thick whitish pile, the median segment with a few fuscous hairs; abdomen shining, slightly pruinose; clypeus broadly convex, its apex rounded, the labrum projecting beyond it, a deepish depression on the sides of the clypeus at the base; occiput transverse in the middle, the sides rounded; pronotum a little narrowed anteriorly; median segment with a slight slope to the apex, when it becomes oblique, apex bluntly rounded. Black, the abdomen and legs rufous, the scape beneath and orbits and the face obscure yellowish, the flagellum brownish beneath; the coxæ and trochanters of the legs and basal two segments of the abdomen black; wings dark smoky-fuscous.

Hab. Poona, Bombay. *Length* a little over 9 mm. Type in Mr. Wroughton's collection.

261. **Salius sinensis.**

Pompilus sinensis, *Smith, Cat.* iii, p. 148.
Salius læta, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 444.

♀. Head, pro- and mesontum, and scutellum pruinose; median segment coarsely transversely striate; abdomen sessile or pseudosessile, very slightly pruinose, the apical segment with stiff bristly hairs; clypeus transversely oval, its anterior margin widely emar-

ginate in the middle; median segment rounded posteriorly, the sides compressed and a little raised. Head, pro- and mesonotum, the scutellum, the legs, and the abdomen, except the basal segment, testaceous red; the face in front, the pro- and mesonotum, and scutellum with glistening golden pile; the thorax on the sides and beneath, the postscutellum, median segment, coxæ of all the legs, and the basal segment of the abdomen black, the remaining segments of the abdomen shaded with fuscous black above; wings dark fuscous with a purple effulgence.

♂ similar, but the median segment is longer and less markedly striate, and the testaceous red of the head and thorax is more or less shaded with fuscous. Var. *læta* has the abdomen, except the basal segment, pure testaceous red without any fuscous shading.

Hab. Burma; Tenasserim; China. ♀. *Length* 16–24; *exp.* 30–46 mm. ♂. *Length* 14–21; *exp.* 28–40 mm. I have carefully examined Smith's types and compared them with a long series in my own collection; the two, *Pompilus sinensis* and *Salius læta*, are varieties of one insect.

262. **Salius indicus**, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 444 & 448; *Bingh. Jour. Bomb. N. H. Soc.* viii, 1893, p. 374, pl. i, fig. 10, ♀.

♀ ♂. Very closely allied to *S. smithii*, Bingh., but larger and more stoutly built; the pronotum anteriorly transverse, but the anterior lateral angles not produced; the apex of the median segment more vertically truncate, and the transverse striations coarser. In a very large series of specimens in my collection the whole of the 1st segment of the abdomen is black, and in this point differs from Mr. Cameron's description.

Hab. Sikhim; Burma; Tenasserim. ♀. *Length* 17–25; *exp.* 36–40 mm. ♂. *Length* 15–18; *exp.* 30–38 mm.

263. **Salius smithii.**

Mygnimia fervida, *Smith, Jour. Linn. Soc.* 1861, p. 82, ♀ ♂ (*nec* Priocnemis fervidus, *Smith, Jour. Linn. Soc.* iii (1859), p. 156).

♀. Head and thorax in front shining and with very fine aciculate striæ; median segment transversely striate; abdomen smooth and shining; clypeus transverse, subporrect, its anterior margin with the sides oblique and the middle widely emarginate; front flat, with a vertical faintly impressed line from the anterior ocellus to between the base of the antennæ; pronotum transverse in front, with the anterior lateral angles prominent, subangularly arched posteriorly; median segment short, roundly truncate posteriorly; legs stout, the tibiæ and tarsi spinose, the posterior tibiæ slightly serrate; abdomen stout, pseudosessile, about as long as the thorax. Head and thorax, the coxæ and trochanters of the legs, and the base of the 1st abdominal segment jet-black; the mandibles, labrum, palpi, antennæ, the femora, tibiæ, and tarsi of the legs, apex of the 1st and the whole of the remaining segments of the abdomen ferruginous, the apical segment covered with thick ferru-

ginous pubescence; wings dark fuscous with a purple effulgence, a hyaline spot at the base of the 1st discoidal cell.

♂ similar but smaller, the legs less spinose, the clypeus and pronotum slightly ferruginous red, the wings of a lighter tint.

Hab. Sikhim; Burma; Tenasserim; Borneo; Celebes; New Guinea. ♀. *Length* 17–19; *exp.* 39 mm. ♂. *Length* 12–15; *exp.* 33–36 mm.

*264. **Salius tuberculatus.**

Cyphononyx tuberculatus, *Radoszkowsky, Bull. Soc. Nat. Mosc.* 1888, p. 470.

"Deep blue-black, the head beneath bituberculate; wings black with a violet effulgence.

"*Female.* Colour deep blue-black, studded with blackish hairs. Clypeus large, convex, the margin (anterior ?) transverse; mandibles and antennæ black, the basal joint of the latter very short, the 2nd very long. The head beneath in the middle with two tubercles in the form of blunt teeth. Thorax opaque, metathorax transversely striate. Abdomen opaque, its apical segment studded with black hairs. Legs black, the coxæ bluish. Wings deep violet with a brilliant effulgence passing into greenish. *Length* 17½ mm.

"*Male.* Similar, but the clypeus black. *Length* 18½ mm."

Hab. Nepal.

Unknown to me, but apparently closely resembling *S. iridipennis*, which, however, in all the examples of a series of fifty or more in my collection, is destitute of the two tubercles beneath the head.

265. **Salius zelotypus,** *Bingh. Jour. Bomb. N. H. Soc.* x, 1896, p. 201, pl. i, fig. 8, ♂.

♂. Head, thorax, and abdomen pruinose; clypeus large, convex, its anterior margin sharply truncate, the face above the antennæ with an impressed medial vertical line and a short shallow sulcation on each side of it; pro- and mesonotum also with an impressed medial longitudinal line; median segment transversely striate, somewhat compressed at the sides, and with a rounded slope to its apex; legs long, spinose, the posterior tibiæ serrate; abdomen subpetiolate, smooth. Deep ferruginous red, variegated with fuscous black; the vertex, the flagellum of the antennæ above, the mesonotum, the median segment, except a large round macula on each side close to the apex, some irregular marks on the sides of the thorax, and the posterior margins of all the segments of the abdomen, fuscous black: wings dark brown with a purple effulgence, an irregular hyaline yellow spot (sometimes divided into two or even three spots) occupies part of the 1st and 2nd discoidal, the 1st cubital, and the 2nd submedial cells in the fore wing, and extends in some specimens on to the costal margin of the hind wing; nervures and tegulæ dark brown.

Hab. Tenasserim. In the British Museum there is one specimen from the Tibet frontier. ♂. *Length* 20–24; *exp.* 48–51 mm. ♀ unknown.

266. **Salius venatorius**, *Bingh. Jour. Linn. Soc.* 1896, p. 437, pl. xix, fig. 9.

♂. Head, thorax in front, and abdomen smooth, opaque; median segment smooth at base, coarsely transversely striate towards the apex; clypeus slightly convex, its anterior margin arched obliquely at the sides; antennæ thick and slightly fusiform; eyes parallel; the front slightly concave, with an impressed vertical line down the middle; pronotum short, rounded anteriorly, its posterior margin boldly arched; median segment long, not raised, rounded posteriorly, with a very gradual slope to its apex; legs stout and long, the tibiæ and tarsi slightly spinose; abdomen about as long as the thorax, petiolate and subcompressed vertically. Black, alutaceous; the head, pronotum, and the femora, tibiæ, and tarsi of the legs ferruginous, the apex of the flagellum of the antennæ and the base of the intermediate and posterior femora fuscous; the abdomen with obscure purplish and reddish tints in certain lights: wings fuscous brown, a broad, irregular, hyaline yellow patch on the disc of the fore wing from beyond the apex of the 2nd submedial cell to the apex of the 3rd cubital cell; the nervures and tegulæ fuscous brown, the former testaceous over the hyaline portion.

Hab. Pegu Yoma, Burma. ♂. *Length* 17; *exp.* 30 mm.

267. **Salius placidus**, *Bingh. Jour. Linn. Soc.* 1896, p. 437.

♂. Head and thorax densely pruinose; abdomen smooth, opaque; clypeus slightly convex, much broader than high, its anterior margin sharply transverse; the front above the base of the antennæ tuberculate, becoming slightly concave above towards the vertex, and with a well-marked and deeply impressed vertical line; antennæ long, the flagellum rather thick; the pronotum short, nearly transverse anteriorly, posteriorly arched; scutellum and postscutellum large and prominent; median segment long, gently rounded and lightly transversely striate posteriorly, its anterior lobe broad, smooth, without striæ, but with a deep medial longitudinally impressed line; legs long, the tibiæ and tarsi only slightly spinose, the posterior tibiæ grooved but not serrate; abdomen asl ong as the head and thorax, petiolate, and vertically flattened. Black, the head and thorax with a dense silvery-grey pile; the labrum, palpi, mandibles, clypeus, and the inner and outer orbits of the eyes, interrupted broadly on the vertex, yellow; the scape and flagellum of the antennæ below, the femora, tibiæ, and tarsi of all the legs, and the 2nd and following segments of the abdomen, pale orange-red; wings fusco-hyaline, the base of the 1st discoidal and upper portion of the 2nd submedial cell clear hyaline; nervures black; tegulæ orange-red.

Hab. Tenasserim. ♂. *Length* 16; *exp.* 31 mm.

268. **Salius præstabilis**, n. sp.

♂. Closely resembles *S. venatorius*, Bingh.: differs in being much more stoutly built; the median segment is raised longitudinally

in the middle and along the sides, with a wide sulcation on each side of the middle ridge, it is more coarsely transversely striate, and the apex is not rounded but truncate; abdomen not vertically compressed and shorter in proportion. In colour the present species has the head, pronotum, mesonotum, scutellum, post-scutellum, the anterior legs, and the apex of the femora, the tibiæ, and tarsi of the intermediate and posterior legs bright ferruginous; the median segment, the coxæ, trochanters, and base of the intermediate and posterior legs, and the abdomen black, with a silky golden lustre in certain lights; wings dull fuscous throughout, with no hyaline patch, and very slightly effulgent.

Varieties have the wing much lighter in colour, nearly hyaline.

Hab. Pegu Yoma, Burma; Tenasserim. ♂. *Length* 15–18; *exp.* 28–30 mm.

269. **Salius acer**, n. sp.

♂. Head, thorax, and abdomen smooth, opaque; clypeus circular, boldly convex, its anterior margin truncate; front concave above the base of the antennæ, with an impressed vertical line from the anterior ocellus; ocelli very prominent, the anterior ocellus much larger than the posterior two; pronotum short, somewhat truncate anteriorly; median segment long, with a steep slope, posteriorly almost truncate; legs long, feebly armed; abdomen vertically flattened, longer than the head and thorax united. Black; head, pro- and mesonotum, scutellum, post-scutellum in the middle, the anterior legs entirely, and the femora, tibiæ, and tarsi of the two posterior pair reddish yellow; the flagellum of the antennæ at apex and the apical joint of the tarsi fuscous; wings light fusco-hyaline, nervures brown, tegulæ reddish yellow.

Hab. Ahmedabad. ♂. *Length* 12; *exp.* 22 mm. ♀ unknown.

270. **Salius bipartitus**, Pl. II, fig. 1.

Calicurgus bipartitus, *Lepel. Hym.* iii, p. 406, ♀.
Priocnemis peregrinus, *Smith, Trans. Ent. Soc.* 1875, p. 37.
Salius peregrinus, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 452 & 455; *Bingh A. M. N. H.* (6) xvi, 1895, p. 442.

♂ ♀. Pruinose; the clypeus subconvex, its anterior margin rounded, posterior bisinuate; mesonotum and scutellum boldly convex; median segment depressed beneath their level, rounded, transversely striated, and somewhat compressed at the sides; legs long, the tibiæ and tarsi thickly spinose, the posterior tibiæ serrate; abdomen somewhat fusiform and petiolate. Black; the head, pro- and mesonotum, and scutellum covered with a dense, short, silky pile, and, together with the apical half of the femora, the tibiæ, and tarsi of the legs, of a rich golden yellow; median segment with short black velvety pubescence; abdomen black, the apical segment studded with stiff ferruginous hairs: wings dark brown with a rich purple effulgence; nervures dark brown; tegulæ yellow. A variable species in colour and very variable in size;

♂. Head, thorax, and abdomen densely pruinose; the head, prothorax in front, the anterior coxæ in front, and the sides of the median segment sparsely pubescent; the clypeus somewhat convex, the sides rounded, widely emarginate anteriorly; front slightly convex; an impressed vertical line from the anterior ocellus to the base of the antennæ, and a transverse furrow on each side of the posterior two ocelli; median segment short, truncate posteriorly, with its apex margined, recurved and slightly produced at the sides; abdomen vertically compressed. Black, with the dense velvety pile giving it a purple bloom in certain lights; the flagellum of the antennæ beneath and the anterior tibiæ and tarsi fulvous brown; wings very dark fuscous brown with a rich purple effulgence.

Hab. Barrackpore. ♂. *Length* 14–16; *exp.* 32–35 mm.

276. **Salius properus**, *Bingh. P. Z. S.* 1896, p. 436, pl. xv, fig. 7, ♀.

♀. Pruinose; head very little broader than the thorax; clypeus transverse, markedly convex, its anterior margin broadly emarginate; the antennæ long, filiform, and slender; the front and vertex slightly but closely punctured; thorax laterally compressed; pronotum short, square, almost transverse anteriorly; median segment long, rounded, lightly transversely striate posteriorly, the apex with a steep slope; legs long, the tibiæ and tarsi spinose, the posterior tibiæ strongly serrate; abdomen long, as long as the head and thorax united, stout and massive, its apical segment studded with long hairs. Black, the pronotum anteriorly, the sides and apex of the median segment, and broad bands above at the base of abdominal segments 2–5 with silvery pile; wings fusco-hyaline, the posterior pair paler; nervures and tegulæ dark brown.

Hab. Ceylon. ♀. *Length* 12; *exp.* 25 mm.

277. **Salius crinitus.**

Priocnemis crinitus, *Bingh. Jour. Bomb. N. H. Soc.* v, 1890, p. 238.

Salius crinitus, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 451; *Bingh. P. Z. S.* 1896, p. 436.

♀. Head, thorax, and abdomen with dense long pubescence, the head and thorax under the pubescence smooth but shining; the median segment finely transversely striate; the abdomen where the pubescence is abraded brilliantly polished and shining; clypeus boldly convex, broader than high, its anterior margin truncate; median segment short, with a steep slope to the apex; abdomen pseudosessile, not so long as the head and thorax united; legs long, spinose, the posterior tibiæ serrate. A rich castaneous black, the pubescence glittering ferruginous golden; the scape and basal three joints of the flagellum of the antennæ and the legs brownish yellow, the apical portions of the antennæ and the claw-joints of the tarsi fuscous black: wings flavo-hyaline, with a golden

lustre in certain lights, the apical margin narrowly fuliginous; nervures and tegulæ brownish yellow.

♂ similar, but not pubescent, the head and thorax covered with only a thin short sericeous golden pile; the abdomen black, somewhat alutaceous, castaneous at base of basal segment; wings darker and broadly shaded with light fuscescent.

Hab. Ceylon. ♀. *Length* 15–17; *exp.* 33–36 mm. ♂. *Length* 16; *exp.* 35 millim.

278. **Salius exilipes,** *Bingh. Jour. Bomb. N. H. Soc.* 1896, p. 202, ♀, pl. i, fig. 9, ♀.

♀. Closely resembles *S. crinitus*, Bingh.; differs in having the thorax longer and less compact, the median segment especially having a very gradual slope to its apex; the abdomen is slighter and distinctly petiolate; the legs are longer, and the wings light brown with a distinct discoidal spot; the 3rd cubital cell is also much narrower at apex than in the preceding species. Like *crinitus* it is covered, especially on the median segment and the basal segments of the abdomen, with long soft golden pubescence.

Hab. Sikhim. ♀. *Length* 19; *exp.* 36 mm. ♂ unknown.

279. **Salius nicevillii,** *Bingh. Jour. Bomb. N. H. Soc.* 1896, p. 199, pl. i, fig. 7, ♀.

♀. Closely resembles *S. fenestratus*, Smith, but is smaller and structurally different; the anterior margin of the clypeus is rounded, not truncate or emarginate; the median segment has a steep rounded slope posteriorly, the apex not truncate; the legs are slender and very long in proportion; the abdomen subpetiolate. In colour it is not so rich a red as *S. fenestratus*, the black bands on the abdomen are broader and not produced forwards in the middle above.

The ♂ has the wings fuscous yellow and the body of a lighter and more testaceous red. As in *S. fenestratus*, there is a variety with dark brown wings.

Hab. Tenasserim; Sikhim; Andamans. ♀. *Length* 24–30; *exp.* 46–52 mm. ♂. *Length* 23–25; *exp.* 40–43 mm.

280. **Salius terrenus,** *Bingh. Jour. Linn. Soc.* 1896, p. 435, pl. xix, fig. 8.

♀. Head and thorax pruinose, median segment finely transversely striate, abdomen finely aciculate; clypeus large, its anterior margin boldly arched and fringed with long hairs, posterior margin transverse; scutellum and postscutellum laterally compressed and very prominent, the former longitudinally and the latter obliquely striate on the sides; median segment with a very steep slope to its apex, very little rounded above, the sides compressed; legs long, the tibiæ and tarsi thickly spinose, the posterior tibiæ serrate; abdomen long, petiolate, somewhat curved. Dull brownish red; the clypeus, the face in front, and the pro- and

mesonotum covered with dense golden pile, very brilliant and glittering in certain lights; median segment more or less fuscous; abdomen with the extreme base and posterior margins of the basal three segments broadly black, the bands not continued on the underside; wings pale oily brown, hyaline, and in certain lights iridescent, a faint fuscous cloud occupies the 2nd and 3rd cubital, and upper part of the 2nd discoidal cell in the fore wing.

♂ similar, but the wings have a large faint fuscous cloud beyond the 2nd cubital cell.

Hab. Sikhim; Burma; Tenasserim. ♀. *Length* 23; *exp.* 44 mm. ♂. *Length* 18; *exp.* 40 mm.

281. **Salius flavus.**

Sphex flava, *Fabr. Ent. Syst.* ii, p. 217.
Pompilus flavus, *Fabr. Syst. Piez.* p. 197; ? *Lepel. Hym.* iii, p. 430.
Priocnemis flavus, *Dahlb. Hym. Eur.* i, p. 457.
Mygnimia flava, pt., *Smith, Cat.* iii, p. 182.
Priocnemis humbertianus, *Sauss. Novara Reise, Hym.* p. 63, pl. iii, fig. 41.
Salius flavus, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 443; *Bingh. Jour. Bomb. N. H. Soc.* x, 1896, p. 214, pl. ii, fig. 1 (var.).
Salius humbertianus, *Cam. t. c.* p. 451.

♀ ♂. Pruinose; clypeus transverse, subemarginate anteriorly, slightly porrect; pronotum very short, the anterior lateral angles a little produced; median segment transversely striate, sometimes coarsely reticulate, the apex truncate, the base with an obscure, medial, shallow, longitudinal furrow; legs long, the tibiæ and tarsi thickly spinose, the posterior tibiæ serrate; abdomen pseudo-sessile, stout, about as long as the thorax. Head, pro- and meso-notum, the apical portion of the femora, the tibiæ and basal joints of the tarsi ferruginous or fulvous yellow; the postscutellum, median segment, head and thorax beneath, coxæ, trochanters, base of the femora, the apical joints of the tarsi, and abdomen black, fuscous black on the tarsi, and with more or less of a purple effulgence in certain lights on the abdomen, which again is variable, having sometimes the apical 4, or 3, or 2 segments, or apex only ferruginous, thickly clad with ferruginous hairs; the pile on the head, pro- and mesonotum is dense and of a golden colour, that on the median segment and abdomen purplish black: wings rich fulvo-ferruginous, the apex of the fore wing beyond the radial cell and of the hind wing narrowly fuscous with a purple effulgence; nervures and tegulæ ferruginous.

Hab. Throughout India, Burma, and Ceylon, extending into the Malay Peninsula. ♀. *Length* 19–22; *exp.* 38–46 mm. ♂. *Length* 13–16; *exp.* 28–35 mm.

In the Banksian collection, now in the Museum of Natural History at South Kensington, there is a specimen of a *Salius* labelled "*flavus*." This, it is probable, was so labelled by Fabricius himself. So far as structure and the sculpturing of the head and thorax go, *Salius* (*Priocnemis*) *humbertianus* of Saussure

is identical with this. The species I took to be the *Sphex flava* of Fabricius (*vide* Jour. Bomb. N. H. Soc. 1896, p. 214, pl. ii, fig. 1), I still think is only an extreme variety of that species.

282. **Salius grassator**, *Bingh. Jour. Linn. Soc.* 1896, p. 436.

♂. Head, thorax in front, and abdomen pruinose, median segment finely reticulate; clypeus broadly convex, its anterior margin straight, truncate; the front flat, with a vertically impressed line from the anterior ocellus to between the base of the antennæ; ocelli large, very prominent and close together; pronotum short, rounded in front, its posterior margin boldly arched; scutellum and postscutellum prominent, large, and somewhat laterally compressed in the middle; median segment rounded posteriorly, with a steep slope to its apex, and bearing a medial longitudinally impressed line; legs long and fairly stout, the tibiæ and tarsi spinose, the posterior tibiæ grooved but not serrate; abdomen petiolate, short, about the length of the thorax, and slightly vertically compressed. Head, pro- and mesonotum, scutellum, postscutellum, and legs fulvous, covered with a rich golden pile; median segment and abdomen black, the latter with velvety pile having a golden lustre in certain lights, the basal and apical three segments slightly reddish in the middle; wings light flavo-hyaline, the apex of the fore wing beyond the 1st cubital cell fuscescent.

Hab. Sikhim. ♂. *Length* 17; *exp.* 36 mm.

283. **Salius sericosoma.**

Pompilus sericosoma, *Smith, Cat.* iii, p. 146, ♀.
Priocnemis sericosoma, *Smith, Jour. Linn. Soc.* 1867, p. 354.
Salius sericosoma, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 452.

♀ ♂. Head, thorax in front, and abdomen smooth, pruinose; clypeus transversely oval, its anterior margin slightly rounded, somewhat porrect, the thorax compressed, the median segment with a rounded slope to its apex, furrowed down the middle and regularly transversely striate; legs with the tibiæ and tarsi thickly spinose, the posterior tibiæ serrate; abdomen subpetiolate. Head, thorax, legs, and the apical two segments of the abdomen ferruginous, the rest of the abdomen black; the whole insect covered with a thin golden pile, which is very dense on the head and fore part of the thorax; wings golden yellow, nervures and tegulæ ferruginous. The golden pile is often much abraded on the sides of the thorax and the abdomen, sometimes completely absent on the latter.

Fig. 32.
Salius sericosoma, ♀. $\frac{4}{3}$.

Hab. India, and throughout Burma and Tenasserim to Sumatra and the Malay Peninsula. ♀. *Length* 16–21; *exp.* 38–41 mm. ♂ very little smaller.

284. **Salius verticalis.**

Priocnemis verticalis, *Smith, Jour. Linn. Soc.* 1858, p. 94; *idem,* 1867, p. 354.

Salius verticalis, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 452; *Bingh. Jour. Bomb. N. H. Soc.* viii, 1893, p. 376, pl. i, fig. 5, ♀.

♀. Head, thorax, and abdomen smooth and shining; clypeus convex, its anterior margin emarginate in the middle; median segment short, somewhat compressed at the sides, roundly truncate posteriorly, the sides of the postscutellum and the whole of the median segment transversely striate; legs with the tibiæ and tarsi strongly spinose, the tibiæ of the posterior legs serrate; abdomen subsessile, all the segments above sparsely punctured at base. Black, the face above the antennæ as high as the vertex, the scape and basal two joints of the antennæ, a broad line on the posterior margin of the pronotum, a square mark on the mesonotum, the middle portion of the scutellum and postscutellum, the apical half of the femora, the tibiæ, and the tarsi of the legs yellow, the apical joint of the last fuscous; the fore part of the mesonotum in fresh specimens with a fine yellow pile; the wings hyaline ochraceous yellow, nervures and tegulæ brownish yellow.

♂. Differs in having the clypeus and sides of the face broadly yellow, the vertex and the forehead to the base of the antennæ, and the whole of the latter except the scape in front black; the wings are of a paler yellow and slightly fuscous at their apex.

Hab. Southern India; Tenasserim; Malacca, and Borneo. ♀. *Length* 23–28; *exp.* 52–58 mm. ♂. *Length* 15; *exp.* 42 mm.

285. **Salius momus,** *Bingh. Jour. Bomb. N. H. Soc.* x, 1896, p. 203, ♀.

♀. Pruinose; head wider than the thorax, convex in front, the occiput emarginate; clypeus convex, transverse anteriorly, emarginate; pronotum in front transverse, the anterior lateral angles rounded, its posterior margin arched; median segment short, rounded posteriorly, lightly transversely rugose, the apex steep, with a short broad shallow sulcation on each side of the median line; legs stout, the tibiæ and tarsi spinose, the posterior tibiæ strongly serrate; abdomen massive, petiolate, as long as the head and thorax united. Black, with a hoary grey pile, dense and silvery in certain lights, especially on the clypeus, sides of the face, and apex of the median segment, and forming bands at the bases of the abdominal segments; the apical segment with a thick tuft of reddish-brown hairs; wings hyaline, the apex of the fore wing, and a faint subapical cloud below the radial cell, lightly fuscous, the tegulæ and nervures black.

Hab. Tenasserim. ♀. *Length* 13–15; *exp.* 20–24 mm.

286. **Salius obsonator,** n. sp.

♂. Head and thorax pruinose, abdomen smooth; head rather small, narrower than the thorax; clypeus remarkably convex, its

anterior margin deeply but widely emarginate; pronotum very short, rounded anteriorly, with a very steep slope, not narrowed towards the head; median segment long, raised down the middle, slightly hollowed out at the sides above; legs long, the tibiæ and tarsi spinose, with indications of serrations on the posterior tibiæ; abdomen not so long as the thorax, and flattened vertically. Black, with thin greyish-white pile on the head and thorax, which gets somewhat more dense on the median segment above: the mandibles except at apex, the clypeus, scape and flagellum of the antennæ beneath, the pronotum in front, the femora, tibiæ, and tarsi of the legs, and the abdomen except at the extreme base, yellowish red; wings very broad, hyaline, with a very slight brownish tinge; nervures dark brown, tegulæ yellowish red.

Hab. North-West Provinces, India. ♂. *Length* 13; *exp.* 27 mm. ♀ unknown.

287. **Salius valentulus,** *Bingh. Jour. Linn. Soc.* 1896, p. 434.

♀. Head and thorax in front slightly pruinose, median segment coarsely reticulate, abdomen smooth; clypeus subconvex, broader than high, its anterior margin widely emarginate, and fringed with stiff hairs; front subtuberculate above the base of the antennæ, and with a short, vertical, deeply impressed line running up to the anterior ocellus; pronotum short, arched in front, the anterior lower angles produced; median segment rounded posteriorly, with a very steep slope at apex, where it is slightly concave; legs stout, the tibiæ and tarsi spinose, the posterior tibiæ strongly serrate; abdomen petiolate, broadly fusiform. Head, thorax, legs, the apical half of the 3rd and the whole of the following three segments of the abdomen black, the basal two segments and basal half of the 3rd light red: wings hyaline, the apex broadly light fuscous, nervures and tegulæ testaceous brown.

Hab. India. ♀. *Length* 16; *exp.* 30 mm.

288. **Salius geminus,** *Bingh. Jour. Linn. Soc.* 1896, p. 436.

♀. Head, thorax in front, and abdomen smooth, median segment finely transversely striate; clypeus transverse, subporrect, its anterior margin fringed with long hairs and broadly but slightly emarginate; the face in front very finely punctured; the antennæ long and filiform; the front above the base of the latter with an abbreviated deep vertical furrow not reaching the anterior ocellus; pronotum rounded in front, its posterior margin arched; median segment rounded posteriorly with a steep slope, the apex somewhat truncate; legs long, the tibiæ and tarsi thickly spinose, the posterior tibiæ serrate; abdomen as long as the head and thorax united, petiolate. Head, thorax, and legs black; abdomen blood-red, a subapical band on the 3rd segment above, the 4th and following segments black, the posterior margins of the 3rd, 4th, and 5th segments very narrowly testaceous red, the apical segment densely pubescent, studded with long coarse black hairs; wings

hyaline, the apex of the fore wing beyond the radial cell and the anterior margin of the hind wing at apex lightly fuscescent.

Hab. Mussooree, N.W. India. ♀. *Length* 12; *exp.* 21 mm.

289. **Salius electus,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 458 & 470.

♀. Head, thorax, and abdomen smooth and shining, the clypeus, and face in front pruinose, the latter slightly convex; the pronotum short, somewhat square in front; scutellum large and prominent; median segment short, well below the level of the scutellum and postscutellum, and with a slightly rounded steep slope to the apex; legs long, the tibiæ and tarsi spinose, the posterior tibiæ strongly serrate; abdomen petiolate, the apex densely villose. Black, the anterior and intermediate tibiæ and tarsi, and the posterior tibiæ at base, with the basal three segments of the abdomen, ferruginous red; the clypeus, sides of the face, median segment, and coxæ on the outside margined with a thin silvery pile visible only in certain lights; wings hyaline, the basal nervure, on the outside narrowly, the basal two-thirds of the radial, the 2nd and 3rd cubital, and apex of the 2nd discoidal cell fuscous.

Hab. Barrackpore, Bengal. ♀. *Length* 8; *exp.* 18 mm.

290. **Salius rothneyi,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 452 & 453.

♀. Head and thorax in front very closely and finely punctured, somewhat shining, the median segment very finely transversely striate; abdomen smooth, polished and shining; clypeus large, rounded anteriorly; two short, well-raised parallel carinæ above the base of the antennæ, with a deep shining fovea between them; pronotum short, steep, considerably narrowed towards the head, subangular posteriorly; median segment rounded posteriorly and divided down the middle by a well-marked furrow, not reaching the apex; legs long, the tibiæ and tarsi spinose, the posterior tibiæ serrate; abdomen petiolate, broadly fusiform, as long as the head and thorax united. Jet-black, the clypeus and front with silvery pile, seen only in certain lights, the apical segment of the abdomen studded with short, not very close fulvous pubescence: wings hyaline, infuscated along the basal nervure of the fore wing, with a broad fuscous cloud from the radial descending into the 2nd discoidal cell, and the apex of the fore wing fuscescent; nervures and tegulæ black.

Hab. Darjeeling; Barrackpore. ♀. *Length* 9–10; *exp.* 18–20 mm.

*291. **Salius cotesi,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 451 & 454.

"Similar in coloration of the body to *S. rothneyi*, as also in having in the wings three clouds, but abundantly distinct in structure. The clypeus at apex is shining and transverse in the middle; the elongated ridges above the antennæ so prominent

in *rothneyi* are absent, as is also the shining fovea, but there is a small carina there; the eyes distinctly diverge beneath; the ocelli are in a triangle and closer to each other; . . . the median segment at the apex is more abrupt; the abdomen is longer, being as long as the head and thorax united, and its apical segments are not so thickly haired; the form of the 2nd cubital cellule is very different; the 1st transverse cubital nervure is elbowed at the middle and bends towards the 2nd, making the top of the cellule there about one-fourth of what it is at the bottom, and about one-third the length of the top of the 3rd; at the bottom the 2nd cubital cellule is about three-fourths of the length of the 3rd; the second transverse cubital nervure is sharply elbowed at the top, making the cellule much narrower at the top than at the bottom, where it is rounded broadly at the apex, instead of acutely angled as in *rothneyi*, while the cubital nervure terminates completely there; the 1st recurrent nervure is received a very little beyond the middle, the 2nd at a less distance from the transverse cubital nervure than is the 1st; the radial nervure becomes elbowed about the basal third (and also more sharply), while in *rothneyi* it turns up at the middle of the cellule. *S. cotesi* also is larger, being 13 mm. in length. The long spur of the hind tibiæ does not reach the middle of the metatarsus; the tibial spines are shorter and fewer."

Hab. Southern India.

Type in the Indian Museum, Calcutta.

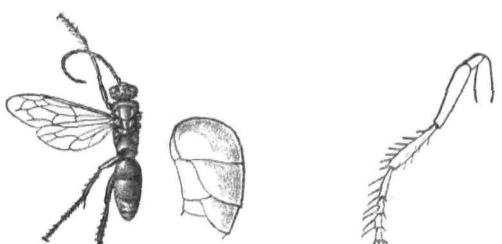

Fig. 33.—*Pompilus analis*, ♀. 1/1.

Genus POMPILUS.

Sphex, pt., *Linn. Syst. Nat.* i, p. 941 (1767).
Evania, pt., et Sphex, pt., *Fabr. Ent. Syst.* ii, pp. 192 & 198 (1793).
Pompilus, pt., *Fabr. Ent. Syst. Supp.* p. 246 (1798).
Ceropales, pt., et Pompilus, pt., *Fabr. Syst. Piez.* pp. 185 & 187 (1804).
Pompilus, *Dahlb. Hym. Eur.* i, p. 443 (1843).
Calicurgus, Pompilus, Anoplius, et Ferreola, *Lepel. Hym.* iii, pp. 397, 416, 440, & 467 (1845).
Pompilus, *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 51.

Type, *P. fuscus*, Linnæus.

Range. Both hemispheres.

Form of the clypeus, pronotum, and median segment very variable. Fore wing with three cubital cells, the 2nd and 3rd as a rule subequal, both cubital and discoidal nervures stopping short of the margin of the wing; anterior tibiæ and tarsi ciliated on the outside, intermediate and posterior tibiæ and tarsi spinose, the tibiæ never serrate, claws unidentate at base below, sometimes bifid. Nesting in the ground, in burrows made by the female; the usual provision for the larvæ consists of spiders, but I have seen one species carrying small cockroaches to its nest.

Key to the Species.

A. Wings more or less hyaline.
- *a*. Wings entirely hyaline.
  - *a'*. Abdomen beyond 2nd segment ferruginous red .... *P. analis*, p. 150.
  - *b'*. Abdomen with basal three segments ferruginous red .... *P. zeus*, p. 150.
  - *c'*. Abdomen grey and black .... *P. wroughtoni*, [p. 151.
- *b*. Basal half only of wing hyaline.
  - *a'*. Thorax red and black.
    - a^2. Pro- and mesonotum red .... *P. cameronii*, p. 170.
    - b^2. Pronotum only red .... *P. circe*, p. 170.
  - *b'*. Thorax entirely black.
    - a^2. Abdomen with grey pruinose bands .... *P. ilus*, p. 171.
    - b^2. Abdomen deep purplish black, without bands .... *P. dimidiatipennis*, [p. 171.
    - c^2. Abdomen with basal three segments ferruginous red .... *P. fenestratus*, [p. 151.
- *c*. Wings hyaline, with apical margin fuscous.
  - *a'*. Head and thorax black; abdomen entirely ferruginous red .... *P. acceptus*, p. 151.
  - *b'*. Head, thorax, and abdomen black, with yellow or white markings.
    - a^2. Posterior tibiæ black.
      - a^3. Median segment with white or silvery pile .... *P. arrogans*, p. 152.
      - b^3. Median segment with blue pile ...... *P. decoratus*, p. 152.
    - b^2. Posterior tibiæ ferruginous.
      - a^3. Fifth abdominal segment with a yellow fascia above .... *P. vagabundus*, [p. 153.
      - b^3. Fifth abdominal segment without any fascia .... *P. capitosus*, p. 153.
  - *c'*. Head, thorax, and abdomen entirely black.
    - a^2. Apex of median segment emarginate.... *P. hecate*, p. 171.
    - b^2. Apex of median segment rounded.
      - a^3. Third cubital cell of fore wing petiolate. *P. vivax*, p. 154.
      - b^3. Third cubital cell of fore wing not petiolate.
        - a^4. Median segment transversely striate above .... *P. mirandus*, p. 172.
        - b^4. Median segment smooth above.
          - a^5. Median segment with a medial longitudinal furrow above .... *P. subsericeus*, [p. 154.
          - b^5. Median segment not furrowed.... *P. herbigradus*, [p. 155.

d. Wings hyaline, with a subapical fuscous cloud or bar.
- *a'*. Head, thorax, and abdomen black .... *P. maculipes*, p. 155.
- *b'*. Head and thorax black, abdomen ferruginous .... *P. mitis*, p. 155.

B. Wings flavo-hyaline.
- *a*. Fore wing with a subapical fuscous fascia .... *P. dehliensis*, [p. 156.
- *b*. Fore wing with a fuscous margin at apex.
  - *a'*. Head, thorax, and abdomen black; the abdomen with grey pruinose bands.
    - a^2. Fore wing with the 3rd cubital cell petiolate .... *P. incognitus*, p. 156.
    - b^2. Fore wing with the 3rd cubital cell not petiolate.
      - a^3. Median segment posteriorly striate on the sides .... *P. lucidulus*, p 156.
      - b^3. Median segment posteriorly not striate.
        - a^4. Posterior femora and tibiæ black .. *P. rothneyi*, p. 169.
        - b^4. Posterior femora and tibiæ ferruginous .... *P. pedestris*, p. 169.
  - *b'*. Head, thorax, and abdomen variegated with yellow and fulvous red.
    - a^2. With only underside of antennæ fulvous red; mesonotum black, immaculate .. *P. orientalis*, p. 157.
    - b^2. Abdomen also marked with fulvous red.
      - a^3. Mesonotum black, with a V-shaped yellow mark .... *P. multipictus*, [p. 158.
      - b^3. Mesonotum fulvous or ferruginous red, immaculate .... *P. infestus*, p. 158.

C. Wings fusco-hyaline.
- *a*. Thorax black.
  - *a'*. Abdomen black with silvery pile .... *P. ariadne*, p. 159.
  - *b'*. Abdomen red and black .... *P. reflexus*, p. 159.
  - *c'*. Abdomen black with bands of grey pile.
    - a^2. Posterior tibiæ with a white spot at base above .... *P. leucophæus*, [p. 160.
    - b^2. Posterior tibiæ without any white spot .. *P. limbatus*, p. 160.
- *b*. Thorax ferruginous red and black.
  - *a'* Mesonotum red.
    - a^2. Head black .... *P. ephippiatus*, [p. 160.
    - b^2. Head red .... *P. lascivus*, p. 161.
  - *b'*. Mesonotum red marked with black ...... *P. vitiosus*, p. 161.
  - *c'*. Mesonotum black.
    - a^2. Abdomen red and black .... *P. zebra*, p. 162.
    - b^2. Abdomen wholly black .... *P. comptus*, p. 162.

D. Wings dark fuscous.
- *a*. Wings with lacteous white markings.
  - *a'*. Thorax black .... *P. myrmecoides*, [p. 172.
  - *b'*. Thorax red .... *P. lusciosus*, p. 173.
- *b*. Wings entirely dark fuscous.
  - *a'*. Abdomen black and red.
    - a^2. Pronotum black.
      - a^3. Median segment truncate at apex .... *P. mæstus*, p. 163.
      - b^3. Median segment rounded at apex .... *P. atripes*, p. 163.
      - c^3. Median segment emarginate with the sides produced posteriorly .... *P. pedalis*, p. 163.
    - b^2. Pronotum black with a yellow fascia.... *P. beatus*, p. 164.

b'. Abdomen entirely black.
- a^2. Head and thorax in front ferruginous yellow .... *P. bracatus*, p. 164.
- b^2. Head and thorax black.
  - a^3. Antennæ and tarsi piceous brown .... *P. dædalus*, p. 165.
  - b^3. Antennæ and tarsi black.
    - a^4. Median segment more or less steeply sloped at apex, or truncate.
      - a^5. Fore wing with 2nd and 3rd cubital cells equal .... *P. canifrons*, p. 165.
      - b^5. Fore wing with 2nd cubital cell wider than the 3rd .... *P. simillimus*, [p. 166.
      - c^5. Fore wing with 2nd cubital cell narrower than the 3rd .... *P. ignobilis*, p. 166.
    - b^4. Median segment with a gentle rounded slope to the apex, not truncate.
      - a^5. Median segment smooth, not longitudinally furrowed .... *P. perplexus*, p. 167.
      - b^5. Median segment with a longitudinal medial furrow .... *P. parthenope*, [p. 167.

E. Wings ferruginous yellow.
- *a*. The 2nd abdominal segment with an elongate ferruginous spot on each side at base ...... *P. bioculatus*, [p. 167.
- *b*. The 2nd abdominal segment with a transverse fascia at base above .... *P. unifasciatus*, [p. 168.
- *c*. The 2nd and 3rd abdominal segments each with a transverse fascia at base above .... *P. aliciæ*, p. 168.

A. *Second ventral segment without a transverse furrow.*

292. Pompilus analis.

Sphex analis, *Fabr. Ent. Syst.* ii, p. 209.
Pompilus analis, *Fabr. Syst. Piez.* p. 188; *Smith, Cat.* iii, p. 143; *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 457.

♀ ♂. Head, thorax in front, and abdomen smooth and shining; median segment pruinose, opaque-looking, rounded posteriorly, truncate at apex; scutellum large and compressed at the sides; legs long, the tibiæ and tarsi with long stout spines. Black, the wings hyaline, the nervures and tegulæ dark brown; the female has the 4, and the male the 5 apical segments of the abdomen ferruginous red.

Hab. Throughout India, Burma, and Ceylon, and occurring in the Malayan regions as far as Celebes. In Burma this is a common species, coming often into houses in search of the little jumping spiders (*Attidæ*) with which it provisions its nest. ♀. *Length* 14–21; *exp.* 27–38 mm. ♂. *Length* 12–15; *exp.* 26–33 mm.

293. Pompilus zeus, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 460 & 472, pl. iii, fig. 21*.

♀. Head and thorax finely but very sparsely punctured; clypeus

* The type is in Mr. Rothney's collection and is marked "*P. cellularis*, Cam.," in, I believe, Mr. Cameron's handwriting: nevertheless, Mr. Cameron described it under the specific name *zeus*, probably because *cellularis* was preoccupied.

transverse, subporrect, its anterior margin arched, slightly truncate in the middle; head large, broader than the thorax, somewhat convex in front, concave posteriorly; median segment short, with a rounded gradual slope, becoming abruptly steep at the apex; legs with the tibiæ armed with long, stout, irregularly placed spines: abdomen longer than the head and thorax united, pseudosessile. Head and thorax black, the apices of the anterior and the apical two-thirds of the intermediate and posterior femora, the tibiæ of all the legs, and the basal three segments of the abdomen blood-red: the tarsi and the apical three segments fuscous, with a reddish tint; wings hyaline, the apical half sordid yellow, the 3rd cubital cell in the fore wing subtriangular and remarkably narrow, measuring on the cubital nervure not quite one-third the width of the 2nd cubital cell.

Hab. Barrackpore, Bengal. ♀. *Length* 9; *exp.* 17 mm.

*294. **Pompilus wroughtoni,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 460 & 464, pl. iii, fig. 10.

"Very similar to *P. rothneyi*, having the same grey pruinose vesture, with the abdominal segments grey and black, and the apex of the median segment concave, the head very little developed behind the eyes, and the abdomen subsessile; but is smaller, narrower, and more slender; the wings are subhyaline throughout, not yellowish or infuscated at apex; the second cubital cellule is much longer at the bottom compared with the third; the third being of the length of the space bounded by the first transverse cubital and the first recurrent, the latter being received at a greater distance from the transverse cubital; the second recurrent is received in the apical fourth of the cellule, not before the middle; and lastly the long spur of the *metatarsus* (? tibia) reaches almost close to the apex of the metatarsus.

"*Hab.* Poona (*Wroughton*)."

295. **Pompilus fenestratus,** *Smith, Cat.* iii, p. 144, ♀; *Jour. Linn. Soc.* 1867, p. 352; *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 458.

♀. Head, thorax, and abdomen smooth; clypeus very convex, its anterior margin boldly arcuate and turned downwards: scutellum raised and prominent; median segment with a smooth rounded slope to its apex, which is recurved; legs with the tibiæ and tarsi spinose, the spines long and scattered, claws unidentate at base below. Head, thorax, and apical segments of the abdomen black, the former two densely covered with silvery pile, the basal three segments of the abdomen and the base of the 4th ferruginous red; wings hyaline for half their length, fuscous beyond.

Hab. India (Bengal); Burma. ♀. *Length* 8; *exp.* 17 mm.

296. **Pompilus acceptus.**

Pompilus elegans, *Smith, New Sp. Hym. B. M.* (1879) p. 150, ♀ (*nec Cress. Trans. Am. Ent. Soc.* i, 1867, p. 109).

♀. Head, thorax in front, and abdomen smooth; median segment transversely striate, with a medial longitudinal furrow, and a short shallow one on each side of it close to the base; clypeus with its anterior margin deeply emarginate, almost bilobed; legs with the tibiæ and tarsi moderately spinose. Head and thorax black, abdomen ferruginous red; wings hyaline, with a broad fuscous border at apex, tegulæ and nervures testaceous brown; the clypeus has a broad border anteriorly of silvery pile, which is continued up the inner margin of the eyes, beneath this pile the surface is ferruginous red, and this latter colour is continued round the orbits of the eyes, interrupted, however, on the vertex; a short transverse stripe on the collar, and another along the posterior margin of the pronotum yellow; the posterior femora with the tibial calcaria bright ferruginous.

Hab. India. ♀. *Length* 20; *exp.* 32 mm.

The type and another specimen, also a ♀, in the British Museum collection are all I have seen.

297. **Pompilus arrogans,** *Smith, Trans. Ent. Soc.* 1873, p. 187, ♀ (*nec Smith, 2nd Yark. Miss., Hym.* 1878, p. 14, ♀).

♀. Obscurely pruinose; head not wider than the thorax; clypeus very slightly convex, almost vertical, its anterior margin widely arched, transverse in the middle; thorax stout, laterally compressed, the pronotum with a steep slope anteriorly; scutellum large and prominent; median segment with a rounded steep slope to the apex, which is perceptibly truncate and flat; legs stout, the tibiæ and tarsi with irregular, scattered spines; abdomen pseudo-sessile, thick at base. Black, the clypeus, front of the face, median segment posteriorly, and a transverse fascia at the base of 2nd and 3rd abdominal segments above with hoary pile; an abbreviated narrow line on the inner margin of the eyes, a broader fascia interrupted in the middle on the posterior margin of the pronotum, a spot on the posterior tibiæ above, and an elongate spot at the base laterally of the 2nd and 3rd segments of the abdomen yellowish white: wings hyaline, broadly infuscate at the apex; nervures and tegulæ black. A variety has the anterior margin of the clypeus narrowly and a square spot at the apex of the mesonotum yellowish white; another has in addition to the usual markings a transverse yellow fascia at the base of the 4th and 5th segments of the abdomen above.

Hab. Tenasserim; Ceylon; Japan. ♀. *Length* 12–15; *exp.* 25–28 mm.

298. **Pompilus decoratus,** *Smith, New Sp. Hym. B. M.* p. 149.

♀. Head, thorax, and abdomen smooth and somewhat shining; clypeus half-moon-shaped, its posterior margin transverse, anterior boldly arched; the mesonotum with an ill-defined shallow medial longitudinal sulcation and an abbreviated furrow on each side close to the apex, not reaching the anterior margin; median segment rounded, with a gradual slope to the apex, the margin recurved;

legs with stout scattered spines, the anterior tibiæ and tarsi feebly ciliated on the outer side; claws bifid; abdomen longer than the head and thorax, subcylindrical. Black, the wings hyaline, with a broad fuscous apical margin to the anterior pair; a narrow line round the orbits of the eyes interrupted on the vertex, the posterior margin of the pronotum, a spot on the mesonotum, another on the side of the thorax close to the base of the fore wing, a third at the base of the posterior tibiæ, with a large irregular mark on each side of the base of the 2nd and 3rd abdominal segments, and a fascia at the apex of the 5th segment, yellowish white; the pronotum and median segment are adorned with pale pubescent pile, and the front below the antennæ with silvery pile.

Hab. Bombay. ♀. *Length* 13; *exp.* 21 mm.

The type and only known specimen is in the collection of the British Museum, South Kensington.

299. **Pompilus vagabundus**, *Smith, Jour. Linn. Soc.* ii (1858), p. 92, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 460.

♀. Pruinose; head broader than the thorax; clypeus subconvex, its anterior margin slightly arched, almost transverse in the middle, oblique at the sides; pronotum with a wide arch posteriorly; scutellum prominent; the median segment gradually sloped to the apex, where it is slightly depressed in the middle; abdomen pseudosessile; legs with the tibiæ and tarsi spinose, the spines stout, the inner calcaria of the intermediate and posterior tibiæ nearly as long as the metatarsus. Black; a line on the anterior margin of the clypeus joining two lateral spots on it, the orbits of the eyes except at the top, the scape of the antennæ in front, the posterior margin of the pronotum, a minute spot on the tegulæ, and transverse fasciæ at the base of the 2nd, 3rd, and 5th abdominal segments, yellow; the fascia on the 2nd segment is interrupted in the middle, that on the 5th is posteriorly emarginate; the flagellum of the antennæ below, and the intermediate and posterior femora and tibiæ, red; wings hyaline, broadly infuscated at apex.

The markings are very variable in this species—the clypeus may be without the submarginal line, the yellow may extend up the face to the base of the antennæ, the mesonotum at apex and the scutellum may be marked with yellow, the femora and tibiæ of the anterior as well as of the other legs may be red, and sometimes the yellow fasciæ on the abdomen except on the 2nd segment are entirely wanting.

Hab. Sikhim; Burma; Tenasserim; extending to Borneo. ♀. *Length* 9–14; *exp.* 20–28 mm. ♂. *Length* 12; *exp.* 26 mm.

300. **Pompilus capitosus**, *Smith, New Sp. Hym. B. M.* p. 147, ♀.

♀. Head, thorax, and abdomen smooth and covered with a thin silvery pile; the clypeus subconvex, its anterior margin arched, the posterior transverse; scutellum large and prominent; median

segment rounded posteriorly; legs with the tibiæ and tarsi armed with stout spines. Black; the wings hyaline, fuscous at apex, nervures and tegulæ testaceous brown; the anterior margin of the clypeus, a line along the inner and outer margin of the eyes not meeting on the vertex, the posterior margin of the pronotum, a small transverse spot at the apex of the mesonotum, a spot on each side at base of 2nd abdominal segment, and a broad line at base of the 3rd, yellow; the posterior tibiæ ferruginous black at base and with a spot of yellow on the outer side.

Hab. Burma; Tenasserim. ♀. *Length* 10–12; *exp.* 22–25 mm. ♂ a trifle smaller.

301. **Pompilus vivax,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 460 & 468, pl. iii, fig. 14.

♂. Pruinose; the head convex in front, transverse posteriorly; pronotum with a rounded slope anteriorly, its posterior margin acutely angled; median segment rounded, gently sloped to the apex; legs long, the tibiæ and tarsi with long stout spines; abdomen pseudosessile, short, the basal segment broad and depressed above at base. Black, the head and thorax with hoary grey pile, most dense on the clypeus and sides of the face; the scape in front, the posterior margin of the pronotum, and a long streak above at the base of the posterior tibiæ yellowish white; the median segment at apex, and abdominal segments 1–4 at base, with thick silvery-white decumbent pubescence; wings hyaline, the apex broadly infuscated, the 3rd cubital cell in the fore wing petiolate. A variety has the wings tinted with yellow, and the underside of the flagellum of the antennæ fulvous red.

Hab. Barrackpore, Bengal. ♂. *Length.* 8; *exp.* 16 mm.

302. **Pompilus subsericeus,** *Sauss. Novara Reise, Hym.* p. 60, fig. 39, ♀ (1867).

Pompilus pruinosus, *Smith, New Sp. Hym. B. M.* p. 147, ♀ (*nec Smith, Cat.* iii, p. 141, ♀).

♀. Densely pruinose; the clypeus transverse, its anterior margin slightly arched; head sessile; pronotum long, posteriorly angulated; mesonotum short, with a slight shallow longitudinal medial sulcation at apex; median segment long, gradually rounded to its apex and with a marked longitudinal groove down the middle; legs with the tibiæ and tarsi slightly spinose, the tibial calcaria long and stout; abdomen subpetiolate, fusiform, and slightly compressed. Black, with hoary grey pile, dense on the clypeus, head and face, on the posterior margin of the pronotum, the apex of the mesonotum, scutellum, postscutellum, and median segment, and on the abdomen, where it forms broad bands on the posterior margins of segments 2–5, leaving the base of these segments black and shining; wings hyaline, the apex broadly infuscated, nervures and tegulæ testaceous.

Hab. Sikhim; Kumaun; Burma; extending to China. ♀. *Length* 10–12; *exp.* 18–21 mm.

303. **Pompilus herbigradus**, n. sp.

♀. Head, thorax, and abdomen pruinose, smooth, but not shining; clypeus transverse, subporrect, its anterior margin very slightly arched, nearly straight; pronotum rounded anteriorly; postscutellum and median segment steeply sloped, rounded posteriorly; legs long, spinose, the tibiæ and tarsi with long spines; the abdomen pseudosessile, curved, not so long as the head and thorax united. Black, the clypeus, the sides of the face, the thorax more or less, especially at the apex of the median segment, and the base of the segments of the abdomen with silvery pile, which is most dense on the clypeus and on the 1st and 2nd segments of the abdomen; the apical two segments of the latter studded with stiff black hairs; wings hyaline, infuscated at apex, nervures and tegulæ piceous.

♂ similar but slighter, with porrect antennæ; the clypeus is longer and more rounded anteriorly, the abdomen vertically compressed. Varies in the wings being fuscescent for half their length at apex, and the antennæ and anterior legs being piceous.

Hab. Sikhim; Tenasserim. ♀. *Length* 9–12; *exp.* 16–20 mm. ♂. *Length* 8–12; *exp.* 17–21 mm.

304. **Pompilus maculipes**, *Smith*, *Trans. Zool. Soc.* vii (1870), p. 186, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 459.

♀. Head, thorax, and abdomen smooth, covered with a thin sericeous silvery grey pile; the clypeus large, subconvex, its anterior margin arched, posterior bisinuate; eyes wide apart, their inner margins parallel; scutellum very large and prominent, compressed at the sides; median segment declivous; legs with stout scattered spines, anterior tibiæ and tarsi ciliated on the outer side, claws bifid. Black; wings clear hyaline, a pale fuscous spot at the apex, and a fuscous fascia occupying the radial, 2nd and 3rd cubital, and apex of the 2nd discoidal cell in the fore wing, the apical border of the hind wing also fuscous, nervures and tegulæ brown; legs with a white spot at the base of the posterior tibiæ above.

Hab. Mainpuri (N.W. Provinces), Kumaun, Sikhim, Burma, and Tenasserim. ♀. *Length* 8–11; *exp.* 19–22 mm.

305. **Pompilus mitis**, *Smith, New Sp. Hym. B. M.* p. 148.
Pompilus buddha, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 457 & 471, pl. iii, fig. 20.

♀. Head, thorax, and abdomen smooth; clypeus transversely ovate, its anterior and posterior margins arched; scutellum prominent, compressed at the sides; median segment with a steep slope to its apex; legs with stout scattered spines, anterior tibiæ and femora sparingly ciliated on the outer side, claws bifid. Head, thorax, and coxæ black, the rest of the legs and the abdomen ferruginous; the mandibles, clypeus, a line along the inner margin of the eyes, the scape in front, the posterior margin of the pronotum, and the tubercles yellowish white; the flagellum of

the antennæ beneath ferruginous; the thorax, coxæ, and femora beneath with silvery pile; wings hyaline, with a fuscous fascia on the fore wing, beyond which the apex of the wing is clear; the extreme base of the abdomen black.

Hab. Bombay and Central India. ♀. *Length* 9–11; *exp.* 15–17 mm. ♂ somewhat smaller.

306. **Pompilus dehliensis**, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 458 & 465, pl. iii, fig. 11.

♀. Densely pruinose; head a little wider than the thorax, clypeus transverse, slightly convex, its anterior margin arched; median segment broad, with a rounded slope to the apex, where the slope is steep with an inward curve; legs stout, the tibiæ and tarsi with short spines; abdomen longer than the head and thorax united, pseudosessile and massive. Black, with glittering silvery pile, most dense on the clypeus, the pronotum anteriorly, the median segment, and abdomen, on the last it forms a broad band at the base and a narrow band at the posterior margin of each segment; wings hyaline with a yellowish tint, the fore wing with a light fuscous cloud occupying the radial, 2nd and 3rd cubital, and upper part of 2nd discoidal cells.

Hab. Delhi, N.W. India. ♀. *Length* 9; *exp.* 16 mm.

307. **Pompilus incognitus**, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 459 & 467, pl. iii, fig. 13.
? Pompilus vischnu, *Cam. t. c.* pp. 460 & 469.

♀. This species is identical in form, sculpture, and markings with *P. pedestris*, Smith, but I keep it apart, as the 3rd cubital cell is petiolate, not subtriangular as in *pedestris*. I have also carefully examined the types * of *P. vischnu*, Cam., in Mr. Rothney's collection, and they as well as the rest of the specimens labelled *P. vischnu* are, so far as I can make out, nothing more than rather small males of *P. incognitus*. All have the 3rd cubital cell in the fore wing petiolate †.

Hab. Barrackpore, Bengal. ♀. *Length* 12; *exp.* 23 mm. ♂. *Length* 9; *exp.* 17 mm.

*308. **Pompilus lucidulus.**
Homonotus lucidulus, *Sauss. Novara Reise, Hym.* p. 50, fig. 31, ♀.
Pompilus lucidulus, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 459.

"♀. Head smooth, sessile, flat in front, sulcated round the base

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* Two specimens, both males, are labelled "*P. vischnu*, Cam., *Type*," in what I believe is Mr. Cameron's handwriting.

† Mr. Cameron has made some mistake in his descriptions of *Pompilus vivax* and *Pompilus vischnu*. Of the former he says (*loc. cit.*), "Second cubital cell petiolate," whereas it is the 3rd cubital cell which is petiolate; *vide* also the Plate figure, which is correct. Of *P. vischnu* he says, "Identical in colour of the body and wings to *P. vivax*, differing in the 2nd cubital cell *not* being petiolate"! The types and all the specimens labelled *P. vischnu* in Mr. Rothney's collection have the 3rd (*not* 2nd) cubital cell petiolate.

of the antennæ; front not tuberculate, but the vertex in the middle above almost raised into a tubercle. Ocelli somewhat small, placed in little pits, forming a triangle; clypeus flat, smooth, the margin widely truncate, subrugulose. Antennæ convolute, the joints long, the first slender and longest. Thorax compressed. Pronotum transversely wide, square, anteriorly very nearly sharply truncate, posteriorly somewhat arched, above slightly convex. The scutellum triangularly raised in the middle, the apex compressed. Postscutellum arched. Metathorax somewhat short, roundly truncate, or better roundly sloped, not tuberculate, posteriorly carinate and striated on both sides, anteriorly and in the middle posteriorly smooth, not sulcate; the apical margin well reflexed, the margin obsoletely trilobate, the middle not emarginate; the anterior lobe of the metanotum nearly hidden in the middle, strongly striate. Abdomen subcompressed, sessile. Tibiæ, the intermediate and posterior sparsely spinose (the posterior pair armed with a double series of 4–5 spines), tarsi spinulose.—Black, covered with cinereous and silvery pile all over, head strongly ashy-grey; the 1–4 abdominal segments with broad silvery bands, the remainder with glittering grey pile. Wings flavo-hyaline, the apex with a broad intra-marginal cloud, the apical margin narrowly hyaline. The radial cell short, the base broad, the apex strongly acuminate; 2nd and 3rd cubitals minute, nearly equal, anteriorly a little narrowed (the interior and outer margin arched anteriorly), the transverse cubital nervure very oblique; the 1st recurrent nervure is received in the middle of the margin, the 2nd a little beyond the middle of the margin; 4th cubital cellule incomplete, very large; the cubital nervure ending a little before the margin of the wing, the discoidal nervure reaching up to the margin.

"*Hab.* Ceylon. ♀. *Length* 10; *wing* 8 mm."

Unknown to me, but seems to resemble *P. rothneyi*, Cam.

309. **Pompilus orientalis.**

Ceropales orientalis, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 432, pl. iii, fig. 4.

Fig. 34.—*Pompilus orientalis*, ♂. ¾.

♂. Head, thorax, and abdomen smooth, very slightly pubescent, the pubescence somewhat more dense on the median segment and base of the abdomen; clypeus transversely oval, convex, its anterior margin very slightly emarginate in the middle; median segment somewhat steeply sloped posteriorly, flattened above towards the apex, with the margin transverse; abdomen short, not so long as the head and thorax together, pseudosessile. Black; the base of the mandibles, the clypeus except a median square, sometimes triangular portion, the inner and outer orbits interrupted above at the vertex, the posterior margin of the pronotum, the tegulæ, two

approximate spots on the scutellum, a spot on the mesopleuræ, the apex of the anterior coxæ, a spot above them on the prothorax, the greater part of the femora, tibiæ, and tarsi, and large lateral spots at the base of the 2nd, 3rd, 4th, and 6th abdominal segments above, yellow; the antennæ beneath and the posterior femora sometimes reddish yellow; the tibial spurs long, whitish, the pubescence silvery white; wings hyaline, the apex of fore wing beyond the radial cell fuscous, the nervures pale testaceous.

Hab. Bengal; Burma; Tenasserim. ♂. *Length* 9–10; *exp.* 19 mm. ♀ unknown.

I have examined the type in Mr. Rothney's collection and it is a true *Pompilus*, the fore tibiæ and tarsi being ciliated.

310. **Pompilus multipictus,** *Smith, New Sp. Hym. B. M.* p. 148.

♂. Head, thorax, and abdomen smooth, slightly pruinose, especially so on the median segment; clypeus subconvex, broader than high, its anterior margin arched, from its centre a short well-marked perpendicular carina runs up to between the antennæ, on each side of which the face is hollowed slightly; the scutellum very large and prominent; the median segment with a gently rounded slope to its apex; legs with stout scattered spines, the anterior tibiæ and tarsi feebly ciliated on the outer side, claws bifid. Black, variegated with yellow and ferruginous brown; wings flavo-hyaline, their apex broadly fuscous, tegulæ and nervures testaceous yellow; the clypeus, except a spot at its base above, a broad stripe along the inner and outer margin of the eyes, not meeting on the vertex, the scape of the antennæ, the prothorax, except an irregular brown mark in front, a V-shaped mark on the mesonotum, a large spot on each side of the scutellum, the apex of the median segment, a line on the mesopleuræ beneath the wings, the coxæ in front, the apex of the femora, the tibiæ and tarsi of the anterior legs, the bases of the tibiæ, and of the 1st, 2nd, and 3rd joints of the intermediate and posterior tarsi, and the base, above and below, of all except the 1st and apical segments of the abdomen, yellow. A variety has the yellow markings on the face and abdomen more or less ferruginous.

Fig. 35.—*Pompilus multipictus*, ♂. $\frac{1}{1}$.

Hab. Malabar; Sikhim; Tenasserim; Japan. ♂. *Length* 15–18; *exp.* 28–35 mm. ♀ unknown.

311. **Pompilus infestus,** *Bingh. Jour. Linn. Soc.* 1896, p. 430.

♀. Head, thorax, and abdomen smooth; the clypeus convex, transversely rectangular, its sides rounded; the front of the face flat, with an abbreviated impressed line running from the anterior ocellus to between the antennæ; median segment short, rounded

posteriorly, and with a steep slope to its apex; legs stout with a few scattered spines, anterior tibiæ and tarsi feebly ciliated on the outer side. Ferruginous red; the wings flavo-hyaline, broadly infuscated at apex, nervures brown, tegulæ ferruginous; the clypeus, the inner margin of the eyes, a line on the posterior margin of the pronotum, a spot on the posterior tibiæ at base, the basal two joints of the intermediate and posterior tarsi, and the 3rd and 4th segments of the abdomen yellow.

Hab. India. ♀. *Length* 15; *exp.* 25 mm.

The type and only known specimen is in the collection of the British Museum, South Kensington.

312. **Pompilus ariadne,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 457, & 462, pl. iii, figs. 7, 7 *a.*

♀. Head, thorax, and abdomen pruinose; head strikingly concave behind, convex in front and sessile; pronotum long; scutellum and postscutellum somewhat prominent; median segment long, with a gradual slope posteriorly, depressed at apex in the middle, the sides produced into slight conical projections; the whole thorax and also the abdomen, which is pseudosessile, compressed laterally; legs stout, the tibiæ and tarsi slightly spinose. Black; the anterior margin of the clypeus, the antennæ beneath, and the tarsi testaceous, the posterior tibial calcaria white; the head above, the pro- and mesonotum, and the segments of the abdomen at base covered with thin silvery pile; wings fusco-hyaline.

Hab. Barrackpore, Bengal; Tenasserim. ♀. *Length* 6–7; *exp.* 11 mm.

313. **Pompilus reflexus,** *Smith, Trans. Ent. Soc.* 1873, p. 189, ♀.
Pompilus familiaris, *Smith, New Sp. Hym. B. M.* p. 147, ♀ (*nec Smith, Cat.* iii, p. 150).
Pompilus detectus, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 458 & 474, pl. iii, fig. 25.

♀. Head, thorax, and legs pruinose; abdomen smooth, somewhat shining; head much broader than the thorax; clypeus transverse, its anterior margin porrect, straight in the middle, oblique at the sides; thorax laterally compressed, the median segment rounded posteriorly, the slope at apex steep; legs stout, with the tibiæ and tarsi sparsely spinose; abdomen pseudosessile, as long as the head and thorax together. Black, the head and thorax in certain lights with silvery pile, most dense on the clypeus, sides of the face, and median segment; the basal abdominal segment except at the extreme base, the 2nd, and basal half of the 3rd ferruginous red, the remainder black, the apex of the anal segment reddish with stiff scattered hairs; wings fusco-hyaline, with a broad darker fuscous margin at apex; nervures and tegulæ testaceous brown.

Hab. Sikhim; Burma; Tenasserim; Japan. ♀. *Length* 10-11; *exp.* 19-21 mm.

314. **Pompilus leucophæus,** *Smith, Jour. Linn. Soc.* 1858, p. 92, ♂; *idem*, 1867, p. 352.

♂. Head, thorax, and abdomen smooth, densely pruinose; clypeus transverse, subconvex, its anterior margin slightly emarginate; thorax long, nearly as long as the abdomen, the median segment with a very slight slope to its apex; the tibiæ and tarsi spinose, the calcaria of the intermediate and posterior tibiæ about two-thirds the length of the metatarsus; abdomen subpetiolate, slightly flattened vertically. Black, covered with dense slate-coloured pile, which forms broad bands on the abdomen at the base of the segments; wings fusco-hyaline, clearer at their base; a large spot on each side on the clypeus, the inner margin of the eyes to above the base of the antennæ, an abbreviated line on the outer margin, and the posterior margin of the pronotum yellow; the antennæ beneath fulvous, the calcaria of the intermediate and posterior legs white.

Hab. Sikhim; Tenasserim; Malay Peninsula. ♂. *Length* 11; *exp.* 22 mm.

315. **Pompilus limbatus,** *Smith, Jour. Linn. Soc.* 1861, p. 78, ♂; *idem*, 1867, p. 353.

♂. Head, thorax, and abdomen smooth, pruinose; clypeus subconvex, its anterior margin truncate; the pronotum short, its posterior margin arched; the median segment with a steep slope, slightly rounded, and bearing an obscure impressed line down its middle; legs very long, the tibiæ and tarsi spinose; the calcaria of the intermediate and posterior tibiæ nearly as long as the metatarsus; abdomen subpetiolate. Head, thorax, and abdomen blue-black; the sides of the clypeus, the lower portion of the inner margin of the eyes, an abbreviated line behind them, and a line on the posterior margin of the pronotum yellow; the antennæ fulvous beneath; the face in front, the sides of the thorax, the coxæ, trochanters, and femora, and a band at the base of the 2nd and 3rd segments of the abdomen covered with a thin sericeous silvery pile; wings fusco-hyaline, lighter at the base.

Hab. Sikhim; Tenasserim, extending to Celebes. ♂. *Length* 16; *exp.* 30 mm.

316. **Pompilus ephippiatus,** *Smith, New Sp. Hym. B. M.* p. 148.

♀. Head, thorax, and abdomen smooth: the clypeus subconvex, its anterior margin very slightly emarginate; thorax long, prothorax bulging at the sides, broader than the mesothorax; median segment level, rounded and truncate at apex; legs with stout scattered spines, anterior tibiæ and tarsi ciliated on the outer side, claws bifid. Black, with the pro- and mesonotum and scutellum ferruginous red; wings fusco-hyaline, with a broad darker fuscous border; a line along the inner margin of the eyes and an abbreviated one behind them yellow, vertex ferruginous; the median segment and legs with a fine changeable silvery pile, and the apical

margins of the abdominal segments with fasciæ of the same, which on the 2nd, 3rd, and 4th segments are prolonged forward angularly.

Hab. Bombay. ♀. *Length* 12; *exp.* 18 mm.

The type and only known specimen is in the collection of the British Museum at South Kensington.

317. **Pompilus lascivus,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 459 & 475, pl. iii, fig. 26.
Pompilus ignicolor, *Bingh. P. Z. S.* 1896, p. 432, ♀, pl. xv, fig. 2.

♀. Head and thorax in front very finely granular and opaque; median segment and abdomen pruinose; head broad, broader than the thorax; clypeus transverse, subporrect, its anterior margin widely arched; pronotum bulging at the shoulders, laterally narrowed towards the head; scutellum large, triangularly compressed in the middle; median segment broad, rounded posteriorly, with a somewhat steep slope to the apex; legs stout, the tibiæ and tarsi sparsely spinose; abdomen pseudosessile, about as long as the head and thorax together. Head, pro- and mesonotum, scutellum and postscutellum dull brick-red; median segment and abdomen opaque black; the flagellum of the antennæ, anterior and intermediate legs obscurely fuscous red; wings light fusco-hyaline, clear hyaline at base and extreme apical margin of the fore wing.

Hab. Barrackpore, Bengal; Ceylon. ♀. *Length* 8; *exp.* 14 mm.

*318. **Pompilus vitiosus,** *Smith, J. A. S. B.* xlvii, pt. 2, 1878, p. 167, ♂.

"♂. Ferruginous; the thorax with black markings, and the abdomen fusco-ferruginous towards the apex. The antennæ fuscous above; the eyes and tips of the mandibles black; the front before the antennæ pale reddish yellow. The mesothorax with a black longitudinal stripe on each side; the thorax at the sides and beneath paler than the disk, and with a golden lustre, the pectus black; wings fusco-hyaline. The extreme base of the abdomen black, the 1st, 2nd, and 3rd segments with their apical margins fusco-ferruginous, the following segments entirely so.

"*Length* 6½ lines."

Hab. Tenasserim.

This species was procured in December 1876, by Mr. Ossian Limborg, somewhere east of Moulmein, probably at the foot of Moolayit, a peak 5000 feet in height, in the Dawnat range. The type is, I believe, in the Museum of the Asiatic Society of Bengal at Calcutta, but I have not seen it; and although I have collected over the same ground as Limborg I have never procured this *Pompilus*.

*319. **Pompilus zebra,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 460 & 475, pl. iii, fig. 27.

"Black, the mandibles, apex of clypeus, inner orbits of the eyes to near the top broadly, the outer narrowly, a broad band on the pronotum, tegulæ, the abdomen with a band on the base of the 2nd segment, the 3rd entirely, on the others except a band on the base of the 4th, the apex of the femora broadly, the tibiæ and tarsi, and the antennæ dull ferruginous; the head and thorax bearing long white hairs. Head a little wider than the thorax; the eyes arcuate above, the rest parallel; ocelli in a triangle, separated from each other by about the same distance that they are from the eyes. Clypeus short, rounded at the apex. Prothorax a little longer than the head, narrowed gradually towards the base. Median segment about as long as the prothorax, gradually rounded to the apex; the apical half bearing a dense covering of white hair. Abdomen semisessile, a little longer than the head and thorax united; its apex moderately acute; the apical segment aciculate. Legs densely pruinose, stout, the tibiæ with reddish spines widely separated, the three middle being the longest; the long white spur of the hind tibiæ reaches beyond the middle of the metatarsus. Claws with a thick basal tooth. There is no apparent sculpture on the body; there is a narrow furrow in the centre of the front; the occiput convex. The stigma is obscure testaceous; the hind wings are only infuscated at the apex.

"*Length* 10–11 mm.

"*Hab.* Shillong."

*320. **Pompilus comptus,** *Lepel. Hym.* iii, p. 425, ♀; *Smith, Cat.* iii, p. 144; *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 457.

"Antennæ blackish, tinted with red below. Head black, base of the mandibles reddish; the clypeus and front almost up to the antennæ covered with a silky, silvery pile; above this the orbits of the eyes up to the vertex reddish. Thorax black, the prothorax, the metathorax above, and scutellum reddish. Abdomen black, with silvery pile; 2nd, 3rd, 4th, and 5th segments with an oval black mark on each side, these spots nearly meeting above. Legs black, clothed with silvery pile. Wings somewhat fuscous, chiefly at the apex and along the posterior margin. The whole insect is covered with this silvery pile, but only such portions have been noted as are conspicuous, from the density of the pile. Prothorax rather long, nearly square, its posterior border angularly emarginate. Metathorax rather long, bearing a longitudinally impressed line, squarely truncate posteriorly, with two large and semicircular fosettes. Third cubital cell narrowed towards the radial, smaller than the second. Female.

"*Hab.* India."

***321. Pompilus mœstus.**

Pompilus arrogans, *Smith, 2nd Yark. Miss., Hym.* 1878, p. 14, ♀ (*nec Smith, Trans. Ent. Soc.* 1873, p. 187, ♀).

" ♀. *P.* ater, abdominis basi rufo-ferruginea, alis anticis fuscis.

" Black, the head subopaque and finely longitudinally rugulose; the anterior margin of the clypeus slightly rounded, the mandibles rufo-piceous at their apex. Thorax slightly shining above, and having a thin grey sericeous pile; the metathorax concave in the middle posteriorly: the anterior wings fuscous, palest at their base; the posterior pair hyaline, with the apex slightly clouded; the second submarginal cell subquadrate, the third longer than the second and slightly narrowed towards the marginal cell; the tarsi thickly spinose, the tibiæ with a few scattered spines; the tips of the claws of the tarsi ferruginous. Abdomen: the three basal segments ferruginous, the apical margin of the third and the following segments black. Female, length 6 lines.

" *Hab.* Dras, Kargil, and Leh in Ladák. Taken in August and September."

***322. Pompilus atripes,** *Smith, 2nd Yark. Miss., Hym.* p. 14, ♀

" ♀. *P.* niger; abdomine ferrugineo, apice nigro; alis fuscis; antennis crassis.

" Black; the head smooth and shining, very finely punctured; the antennæ much thicker in the middle than is usual in the genus. Thorax finely pilose, shining, and finely punctured above; the posterior margin of the prothorax angulated; the metathorax smooth and shining, with a central impressed line not quite extending to the apex; wings fuscous, clearer towards their base; legs entirely black, as are also the spines and calcaria that arm the tibiæ at their apex; tibiæ only very slightly spinose. Abdomen smooth and shining; the three basal segments ferruginous. Female, length 3¼ lines (7 mm.).

" *Hab.* Murree, Punjab hills."

Unknown to me, but, so far as the description goes, very close to the same author's *P. reflexus*, if not identical with it.

NOTE.—*Pompilus divisus*, Smith, described in the same work as coming from the Sind valley, Kashmir, proved when set out to be not a *Pompilus* at all but an ichneumon (see Waterhouse's 'Aid,' ii, pl. 169, fig. 2).

***323. Pompilus pedalis,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 459 & 461, pl. iii, fig. 6.

" Black, the basal two segments entirely and the basal two-thirds of the third red; the head and thorax densely covered with grey pile; the wings fusco-violaceous, the base to the transverse basal nervure subhyaline. Eyes arcuate, distinctly converging

beneath. Ocelli large, in a curve, separated from each other by a much greater distance than they are from the eyes; the anterior in a pit; and an oblique short furrow runs from the posterior. Clypeus short, subarcuate. The head almost hoary, with a greyish-white pubescence; on the top it is shorter, convex in front, concave behind. Occiput convex. Prothorax longer than the head, longer than broad, narrowed towards the head; at apex angled in the centre. Median segment as long as the prothorax; with a very slight slope above, the sides at the apex projecting into a longish sharp triangular tooth. Abdomen sessile, longer than the head and thorax united, pruinose; the apical segment impunctate. Antennæ short, about as long as the thorax, stout. Legs densely pruinose; the hinder tibiæ sparsely spined; the hind tibiæ not much longer than the metatarsus; the long spur of the hind tibiæ reaches to the middle of the latter. Claws bifid at apex; the tarsi without a brush."

Hab. Barrackpore.

No measurements are given nor is the sex mentioned. The species is unknown to me.

*324. **Pompilus beatus**, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 457 & 473, pl. iii, fig. 22.

"Black; the pronotum with a broad yellow band; the three basal segments of the abdomen, except the apex laterally of the third, red; wings fusco-violaceous. Head small, narrower than the thorax, convex in front, and to a less extent behind. Eyes sharply arcuate at the top, reaching well back behind laterally; converging a little below. Ocelli in a curve, separated from the eyes by a less distance than they are from each other. Head longish from the front view, the clypeus being produced below the eye; its apex transverse. Clypeus and cheeks covered with a dense silvery pubescence. A narrow furrow on the front. Prothorax a little longer than the head, broadly arcuate behind, narrowed a little towards the head. Median segment with a gradual slope, and with a transverse ridge at the apex. Abdomen sessile, very gradually and slightly narrowed towards the apex, pruinose; the two apical segments densely covered with silvery pubescence. Legs stout, the hinder tibiæ with the spines of moderate thickness and length; the long spur of the hind tibiæ reaching close to the apex of the metatarsus. Antennæ short, stout, tapering towards the apex. Second (? third) cubital cellule subpetiolate.

"*Hab.* Bangalore, South India (*Indian Museum, Calcutta*)."

325. **Pompilus bracatus**, *Bingh. Jour. Bomb. Nat. Hist. Soc.* v, 1890, p. 236, ♀ (non ♂); *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 457.

♀. Smooth, pruinose; the clypeus subconvex, its anterior margin boldly arched, posterior transverse, bisinuate; the eyes

convergent, above about half the width apart that they are below, the front with an impressed line from the anterior ocellus to between the antennæ; mesonotum with a longitudinal short furrow close to each tegula; median segment with a rounded slope posteriorly, its apical margin recurved; legs with the tibiæ and tarsi thickly spinose, claws unidentate at base below; abdomen pseudosessile. Velvety black; wings fuscous, with a broad dark apical margin; the middle of the wings obliquely subhyaline, with a yellowish tint, nervures fuscous; tegulæ ferruginous; head (except a fuscous mark round and below the ocelli), a broad stripe on the posterior margin of the pronotum, a spot on the scutellum, and the apical half of the femora, with the tibiæ and tarsi, ferruginous; the apex of the antennæ and the last two joints of the tarsi fuscous; abdomen covered with a short, dense, soft, velvety pile. The ♂ differs in having less of the ferruginous colour about it, and in the tibiæ and tarsi being less spinose.

Hab. Sikhim; Burma; Tenasserim; Japan. ♀. *Length* 16-19; *exp.* 28-35 mm. ♂ somewhat smaller.

326. **Pompilus dædalus,** *Bingh. Jour. Linn. Soc.* 1896, p. 429.

♀. Head, thorax, and abdomen smooth and shining; clypeus convex, subtriangular, its anterior margin very slightly rounded, nearly transverse; the inner margin of the eyes distinctly curved outwards; a well-marked impressed line from the anterior ocellus to between the bases of the antennæ; the occiput transverse, almost emarginate; the sides of the mesonotum raised, and a short shallow longitudinal furrow on each side above the tegulæ; the scutellum prominent; the median segment short, truncated at apex, the truncation with obscure transverse striæ; legs stout; the tibiæ and tarsi spinose; abdomen pseudosessile, obscurely pruinose. Head, thorax, and abdomen black; the antennæ, and the tibiæ and tarsi of all the legs piceous brown; wings fuscous brown, the apex of the radial cell in the fore wing acutely angled, the 2nd and 3rd cubital cells subequal, the posterior margins of the segments of the abdomen narrowly testaceous.

Hab. Sikhim; Tenasserim. ♀. *Length* 15-19; *exp.* 28-36 mm.

327. **Pompilus canifrons,** *Smith, Cat.* iii, p. 146, ♀.
Priocnemis canifrons, *Smith, Jour. Linn. Soc.* 1867, p. 354.
Pompilus atropos, *Smith, New Sp. Hym. B. M.* p. 146.
Salius canifrons, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 450.

♀. Head, thorax, and abdomen smooth, pruinose; clypeus transverse, its anterior margin slightly arched and curved downwards; the scutellum large, compressed at the sides; the median segment short, with a steep, slightly rounded slope to its apex, bearing an obscure longitudinal medial furrow, which does not extend to the apex; legs stout, the tibiæ and tarsi spinose, the

claws unidentate at base below, not bifid; abdomen sessile, acuminate at apex. Black; the wings dark fuscous, with a purple effulgence; the clypeus, median segment, coxæ, trochanters, and base of the femora with a thin silvery pile; the abdomen with bands of cinereous pile at the base of the 1st–5th segments above and below, the apical segment entirely covered with cinereous pile and studded with stiff black hairs. The form of the median segment varies, it is sometimes long with the apex rounded, steep, almost truncate; the cinereous bands on the abdomen are also in some specimens abraded more or less, or completely wanting.

Hab. India; Burma; Tenasserim; Sumatra. ♀. *Length* 15–19; *exp.* 29–38 mm.

328. **Pompilus simillimus,** *Smith, New Sp. Hym. B. M.* p. 149, ♀.

♀. Closely resembles *P. canifrons* and *P. perplexus*, Smith; differs in the median segment being square not rounded, its lateral angles being produced into tubercles, and its posterior face being markedly concave. Like *canifrons*, this species is black, with bands of plumbeous grey pile at the base of the segments of the abdomen; wings fuscous, the 2nd and 3rd cubital cells equal.

Hab. Calcutta. ♀. *Length* 13; *exp.* 26 millim.

The type and only specimen I have seen is in the collection of the British Museum, South Kensington.

*329. **Pompilus ignobilis,** *Sauss. Novara Reise, Hym.* p. 60, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 459.

"♀. Somewhat stout, smooth. Head compressed, well separated from the thorax; ocelli in a triangle, and therefore placed slightly on the slope of the vertex; clypeus short, transverse, a little arcuately emarginate. Front sulcate, not at all or but very slightly tuberculate above the antennæ. Eyes subarcuate, converging at top. Pronotum anteriorly broadly round, posteriorly arched. Scutellum level in the middle, narrowed posteriorly. Metathorax smooth, short, roundly truncate, furrowed, the anterior lobe hidden, smooth on either side; no tubercles on the stigmata. Abdomen ovato-conical, longer than the head and thorax, the 2nd and 3rd segments triangularly depressed on the margin. Body not pubescent, but pruinose; head, pronotum, and thorax below somewhat cinereous; the clypeus and the lower part of the face silvery; labrum fusco-testaceous; the pleuræ, metanotum, antennæ, legs, and abdomen with bluish-purple pile; the last at apex and below with black hairs. The intermediate and posterior tibiæ strongly spinose in rows, the tarsi spinose, beneath with dense minute spines; claws armed beneath with an erect tooth. Wings fusco-violaceous, iridescent, the apex submarginally marked by a pale arched line, the extreme apex purplish; radial cell lanceolate, the apex acute; 2nd cubital cell much broader than high, receiving the 1st recurrent nervure nearly at the apex; the 3rd cubital cell

a little in shape of a trapezium, receiving the 2nd recurrent nervure a little beyond the middle; the 2nd transverse cubital nervure oblique.

"*Hab.* Ceylon. ♀. *Length* 19; *wing* 16 millim."

330. **Pompilus perplexus**, *Smith, Cat.* iii, p. 147, ♀.
Priocnemis perplexus, *Smith, Jour. Linn. Soc.* 1867, p. 354.
Pompilus lachesis, *Smith, New Sp. Hym. B. M.* p. 146.
Salius perplexus, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 452.

♀. Closely resembles *P. canifrons*, but is a slighter, smaller insect altogether, the anterior margin of the clypeus is more arched, the thorax longer in proportion, the median segment more rounded posteriorly, the tibiæ and tarsi of the legs less spinose, and the abdomen more cylindrical in form. Black; the wings light fuscous, somewhat hyaline at base; abdomen with a purple bloom seen only in certain lights.

Hab. Sikhim; Tenasserim; Sumatra. ♀. *Length* 11–14; *exp.* 22–27 mm. ♂ somewhat smaller and slighter.

*331. **Pompilus parthenope,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 459 & 476.

"Black, the wings fusco-violaceous. Eyes almost parallel. Ocelli separated from the eyes by a distinctly greater distance than they are from each other. Clypeus with the sides rounded, the middle slightly waved and margined. Head moderately well-developed behind the eyes; the occiput a little concave. Pronotum hardly so long as the head; the sides rounded. Median segments (segment?) a little longer than the prothorax, having a gradually rounded slope to the apex; the middle with a wide shallow furrow; alutaceous, covered with a fulvons down. Abdomen shining; the petiole becoming gradually wider towards the apex, so that it is then more than twice the width of the base. Apical segment rugose, thickly covered with stiff hairs. The second cubital cellule at the top more than twice the length of the third, at the bottom equal in length to it; the third at the top about one-third the length of the bottom; third transverse cubital nervure with a gradual curve to the top; the first recurrent nervure is received near the apex, the second a little beyond the middle. Legs pruinose; the spines sparse; the long *joint* (sic) of the hind tibiæ short, not reaching the middle of the metatarsus.

"*Hab.* South-east Provinces (Madras). *Length* 15 mm."

332. **Pompilus bioculatus,** *Bingh. Journ. Linn. Soc.* 1896, p. 431.

♀. Head, thorax, and abdomen smooth, pruinose; the clypeus subconvex, its anterior margin arched, its posterior nearly transverse; the scutellum large, compressed at the sides; the median

segment short, with a rounded truncation posteriorly; legs with the tibiæ and tarsi spinose, the spines short, stout, and scattered; claws unidentate at base below; abdomen pseudosessile. Black; the head, except an irregular black mark on the front reaching the base of the antennæ, a broad stripe on the posterior margin of the pronotum, a square spot at the apex of the mesonotum, the scutellum in the middle, the legs, except the coxæ, trochanters, base of the femora, and the apical joints of the tarsi, and two linear spots at the base of the 2nd segment of the abdomen, ferruginous red; wings ferruginous, with their apical borders broadly fuscous. The spots on the abdomen are sometimes obsolete.

Fig. 36.—*Pompilus biocculatus*, ♂. 1/1.

Hab. Sikhim, Burma, extending to China and Japan. ♀. *Length* 12–17; *exp.* 30–35 mm. ♂ somewhat smaller.

333. **Pompilus unifasciatus.** (Pl. I, fig. 7.)

Smith, Cat. iii, p. 145, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 460.

Pompilus exortivus, *Smith, Trans. Ent. Soc.* 1873, p. 188, ♀.

♀. Head, pro- and mesothorax smooth, very slightly pubescent; median segment covered with a thin soft pubescence, posteriorly rounded, with a steep slope to the apex; legs with the tibiæ and tarsi stoutly spinose; abdomen pruinose, with a thin covering of short recumbent hairs. Ferruginous red, with a silky lustre in certain lights; the wings ferruginous yellow, broadly fuscous at apex; three or four of the apical joints of the intermediate and posterior tarsi and the abdomen black, the latter has a transverse fascia at the base of the 2nd and the whole of the apical segment ferruginous. A variety has the pro- and mesonotum marked with yellow over the ferruginous, others have the median segment shaded with fuscous, and occasionally the basal segment of the abdomen will have stains of ferruginous red.

Hab. India, Burma, Malacca, China, and Japan. ♀. *Length* 23–26; *exp.* 45–48 mm. ♂ somewhat smaller.

334. **Pompilus aliciæ,** *Bingh. Jour. Linn. Soc.* 1896, p. 431, pl. xix, figs. 5, 5 *a*.

♀. Head, thorax, and abdomen smooth, very slightly pruinose; clypeus broader than high, convex, slightly projecting, somewhat emarginate anteriorly in the middle; prothorax squarish in front, the posterior margin of the pronotum arched; median segment rounded, with a very steep slope to the apex; legs stout, the tibiæ and tarsi spinose, the spines long and irregular; abdomen subsessile, as long as the head and thorax united, its apical segment studded with stiff hairs. Black, the basal two-thirds of the clypeus, the front and vertex, the scape of the antennæ, a broad line on the posterior margin of the pronotum, a square spot

at the apex of the mesonotum, the centre of the scutellum and of the postscutellum, and the tibiæ and tarsi of the legs ferruginous yellow; wings ferruginous, broadly infuscated at apex, the nervures and tegulæ ferruginous; abdomen black, with a broad abbreviated ferruginous line at the bases of the 2nd and 3rd segments above, the apical segment with pale yellow silky pile and a few long ferruginous hairs.

Hab. Mergui; South Tenasserim. ♀. *Length* 20; *exp.* 36 mm.

B. Ferreola Group.—*Second ventral segment with a transverse furrow.*

335. **Pompilus rothneyi,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 460 & 463, pl. iii, fig. 9.
? Pompilus hero, *Cam. t. c.* pp. 459 & 466, pl. iii, fig. 12.

♀. Closely resembles *P. pedestris*, Smith, differs in structure in the following points:—the clypeus is broader, its anterior margin being transverse; in *pedestris* the anterior margin is oblique at the sides and widely emarginate in the middle; the pronotum is longer with a more gradual slope anteriorly, the median segment is slightly longer, and the abdomen more sessile and thicker at base. In colour *P. rothneyi* has the flagellum of the antennæ below and the posterior femora and tibiæ black instead of red, and there is no yellow fascia on the posterior margin of the pronotum. The two species exist together, but, so far as I have been able to observe, *P. rothneyi* frequents the thickest forest, while *pedestris* is to be found in the open and occasionally comes into houses.

Hab. Sikhim; Barrackpore, Bengal; Burma; Tenasserim; Ceylon. ♀. *Length* 11–14; *exp.* 20–24 mm. ♂. *Length* 7–12; *exp.* 21–23 mm.

336. **Pompilus pedestris,** *Smith, Cat.* iii, p. 147.
Priocnemis pedestris, *Smith, Jour. Linn. Soc.* 1867, p. 354.
Salius pedestris, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 452.

♀. Head, thorax, and abdomen densely pruinose; the clypeus transverse, its anterior margin widely emarginate; the front of the face flat; the median segment compressed at the sides, subconvex, nearly level above, posteriorly emarginate; legs with the tarsi spinose, the spines stout and scattered; claws bifid; abdomen pseudosessile. Black, covered with a dense silvery-grey pile, the black colour showing through on the vertex of the head, as a broad interrupted subapical fascia on the posterior border of the pronotum, and as bands on the posterior margins of the segments of the abdomen; wings fusco-hyaline, with a broad apical fuscous margin, the disc yellowish, the nervures and tegulæ testaceous; the intermediate femora narrowly close to the apex, and the apex of the posterior femora and tibiæ blood-red.

Hab. India, Burma, Tenasserim, extending to Sumatra. ♀. *Length* 10–13; *exp.* 22–24 mm.

337. **Pompilus cameronii,** *Bingh. Jour. Bomb. N. H. Soc.* viii, 1893, p. 378, pl. i, fig. 6.
Ferreola fenestrata, *Bingh. (nec Smith) Jour. Bomb. N. H. Soc.* v, 1890, p. 239, ♀ ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 460.

♀. Pruinose; the head convex in front; the clypeus oval, its sides oblique, its anterior margin transverse in the middle; prothorax long, anteriorly sharply truncate, its posterior margin transverse above; median segment with the middle and sides raised, sulcated between the raised portions and also bearing a medial longitudinally impressed line, its posterior margin deeply emarginate, the emargination longitudinally striate; legs with the tibiæ and tarsi slightly spinose; abdomen smooth, pruinose. Black, an abbreviated line along the inner orbits of the eyes yellow; the pro- and mesonotum brick-red; the median segment, legs, and abdomen with a beautiful iridescent pile, vivid purple and blue in certain lights; wings fuscous, the base of the fore wing and the hind wing for more than half its length hyaline.

Fig. 37.—*Pompilus cameronii*, ♂. ¼.

♂ similar, but with the anterior margin of the clypeus broadly yellow.

Hab. Burma (Rangoon; Pegu); Tenasserim. ♀. *Length* 17; *exp.* 26 mm. ♂. *Length* 11; *exp.* 17 mm.

338. **Pompilus circe,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 457.
Ferreola fenestrata, *Smith, Cat.* iii, p. 169, ♀ (*nec Smith*, Pompilus fenestratus, *Cat.* iii, p. 144).

♀. Head, thorax, and abdomen pruinose; head sessile, convex in front, concave posteriorly; clypeus small, almost crescentic; the base of the antennæ very low down on the face immediately above the clypeus; the flagellum thick, subfusiform, porrect; pronotum very long, cylindrical, its posterior margin transverse; scutellum large and prominent; median segment long, the sides flattened above, nearly level, only slightly convex, the apex depressed and deeply concave, the sides forming tubercular projections; legs with the tibiæ and tarsi slightly pruinose; abdomen vertically flattened. Black, the thorax posteriorly and the abdomen with obscure purple tints in certain lights; the clypeus and front with silvery pile; the pronotum ferruginous red: wings hyaline at base for half their length; beyond fuscous, with a purple effulgence.

♂ similar but smaller, and with the prothorax and median segment longer in proportion.

Hab. India; Burma; Tenasserim. ♀. *Length* 13; *exp.* 20 mm. ♂. *Length* 11; *exp.* 20 mm.

339. **Pompilus ilus,** *Bingh. Jour. Bomb. N. H. Soc.* viii, 1893, p. 378, pl. i, fig. 7.

Ferreola fasciata, *Bingh.* (*nec Smith*) *Jour. Bomb. N. H. Soc.* v, 1890, p. 241.

Pompilus fasciatus, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 458.

♀. Head, thorax, and abdomen smooth, but very sparsely punctured and slightly pruinose; clypeus subtriangular, widely emarginate anteriorly, the sides rounded; the median segment compressed at the sides, subconvex, almost level above, its posterior face deeply concave, with the sides produced into sharp tubercles; legs with the tibiæ and tarsi having only a very few minute spines; abdomen pseudosessile. Black, the abdomen with a purple bloom and bands of silvery pile on the posterior margins of the 1st–4th segments: wings hyaline for half their length, the apical half fuscous; nervures and tegulæ black.

Hab. Burma; Tenasserim. ♀. *Length* 27; *exp.* 38 mm. ♂ much smaller and slighter. *Length* 15; *exp.* 27 mm.

340. **Pompilus dimidiatipennis.**

Ferreola dimidiatipennis, *Sauss. Hym. d. Nov. Reise*, p. 46, ♀.

Ferreola greenii, *Bingh. Jour. Bom. N. H. Soc.* 1890, p. 240, ♀.

Pompilus dimidiatipennis, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 458.

♀. Pruinose; the head small, sessile with the thorax; clypeus vertical, nearly flat anteriorly, semicircular; pronotum short, its anterior and posterior margins both nearly transverse; scutellum large, prominent, laterally compressed; median segment flattish above, concave posteriorly, the sides produced backwards; legs short, stout, with a few irregular spines; abdomen vertically compressed, longer than the head and thorax together. Black or rather obscure deep blue; the head, the pronotum, mesonotum, scutellum, and a line on the postscutellum covered with silvery pile; the median segment and abdomen with a rich dark violet pile: wings silvery hyaline for half their length from base, the apical half dark fuscous, with a brilliant purple effulgence; nervures and tegulæ black. A variety (*greenii*, Bingh.) has the front over the base of the antennæ strikingly tuberculate.

Hab. Ceylon. ♀. *Length* 17–20; *exp.* 29 mm.

341. **Pompilus hecate,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, pp. 458 & 462, pl. iii, fig. 8.

"♀. Black, pruinose, the face densely covered with a silvery pile; the wings hyaline, the apex infuscated. Eyes broadly arcuate, a little converging beneath; ocelli large, almost forming a triangle, the posterior separated from each other by a greater distance than they are from the eyes. Clypeus short, transverse, the sides rounded. Head behind very little developed and almost transverse. Prothorax not much longer than the head, almost transverse behind, not much narrowed in front. Median part of

scutellum narrowed distinctly towards the apex; median segment longer than the mesothorax, depressed in the middle at apex, the laterally produced angles broad, short. Abdominal segments with a broad belt of silvery pruinose pubescence. Legs moderately long; the hinder tibiæ with few spines—longish and black. The transverse basal nervure is not interstitial.

"Length 7 mm.

"*Hab.* Barrackpore."

The type and only specimen in Mr. Rothney's collection is now without a head and otherwise damaged; I have therefore quoted Mr. Cameron's original description in full.

342. **Pompilus mirandus.**

Ferreola miranda, *Sauss. Novara Reise, Hym.* p. 49, fig. 30, ♀.
Pompilus miranda, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 459.

♀. Head broader than the thorax, smooth; clypeus transverse, anteriorly concavo-truncate; pronotum transverse, broadly square, angularly emarginate posteriorly; scutellum somewhat compressed in the middle; median segment long, the apex slightly narrowed, roundly truncate, above transversely striate and furrowed, posteriorly above emarginate, the lateral angles produced; abdomen compressed, long, longer than the head and thorax united; legs slender, the intermediate and posterior tibiæ armed with a few spines. Blackish plumbeous, with a silvery pile: wings hyaline, nervures fuscous, the apex beyond the radial cell in fore wing infuscate; radial cell short beneath, the radial nervure almost concave in the middle, base and apex acutely angled; 2nd cubital cell broad, oblique on the inner side; 3rd cubital cell much smaller, much arched outwardly at base and apex; 2nd cubital cell receives the 1st, and the 3rd cubital cell the 2nd recurrent nervure in the middle respectively; both cubital and discoidal nervures stop short of the margin of the wing.

Hab. Trincomali, Ceylon. ♀. *Length* 5; *wing* 4 mm.

343. **Pompilus myrmecoides,** n. sp.

♀. Very ant-like in shape and appearance; head and thorax in front strongly aciculate; median segment finely rugulose; abdomen smooth and shining, very finely and only partially aciculate; head strongly convex in front, the occiput concave, the antennæ planted very low down on the front; the pronotum very long, the sides parallel and anteriorly suddenly narrowed towards the head, posterior margin transverse; mesonotum and scutellum very short; median segment rounded posteriorly, with a short longitudinal furrow at base; legs short, the coxæ and femora remarkably stout, tibiæ and tarsi with very minute spines; abdomen long, cylindrical, slightly curved downwards. Dull opaque black; the apical segment of the abdomen, the joints of the tarsi at apex, and the tibial calcaria testaceous: wings dark fuscous; fore wing, a spot in the medial cell, a transverse fascia from the apex of the

1st cubital cell, and a subapical spot beyond the radial cell lacteous white; hind wing clear hyaline.

Hab. Tenasserim. ♀. *Length* 11; *exp.* 20 mm. ♂ unknown. Type in British Museum.

344. **Pompilus lusciosus**, n. sp.

♀. Head and thorax in front strongly aciculate; scutellum, postscutellum, and median segment transversely striate; abdomen smooth and shining; head convex anteriorly, the occiput markedly concave, the clypeus transverse, very narrow; antennæ stout, their bases low down just above the clypeus; vertex very slightly arched, nearly flat, the ocelli particularly small and inconspicuous; pronotum and median segment both much lengthened, subcylindrical, the former rounded and narrowed towards the head, the latter abruptly rounded at apex; legs stoutish, the tibiæ and tarsi with minute spines; abdomen long, as long as the head and thorax together, pseudosessile, subcylindrical; the apical segment long and acute at apex. Head and abdomen black; thorax dull red; the scape, the basal four joints of the flagellum of each antenna, and the legs fuscous red, the tibial spurs testaceous: wings fuscous; fore wing with a large spot in the medial cell, an oblique fascia crossing from the base of the stigma to the posterior margin, and the apex of the wing milky white; hind wing lighter fuscous, nervures and tegulæ testaceous.

Hab. Ceylon. ♀. *Length* 7; *exp.* 12 mm.

This well-marked little species is a typical *Ferreola*, a genus which merges into *Pompilus*.

Genus CEROPALES.

Evania, pt., *Fabr. Syst. Ent.* p. 345 (1775).
Ceropales, *Latr. Préc. caract. gen. Ins.* p. 123 (1796); *Fabr. Syst. Piez.* p. 185 (1804); *Smith, Cat.* iii, p. 177 (1855); *Kohl, Verh. zool.-bot. Ges. Wien,* 1884, p. 51.

Fig. 38.—*Ceropales pernix*, ♂. $\frac{3}{1}$.

Type, *C. maculata*, Fabr.

Range. Both hemispheres.

Head with the labrum exserted beneath the clypeus; eyes reaching up to the base of the mandibles; antennæ in the ♀ like

those of the ♂, never convolute. Fore wing with the basal nervure interstitial; three cubital cells, the 2nd receiving the 1st recurrent nervure before the middle, the 3rd the 2nd recurrent nervure after the middle, the cubital and discoidal nervures both, as a rule, reaching the margin of the wing; legs long, the posterior pair often remarkably so, armature feeble or wanting, the fore tibiæ and tarsi not ciliated; abdomen short, 2nd ventral segment without a transverse furrow; the sting-sheath in the ♀ sometimes exserted.

Nothing, so far as I know, has been ascertained about the habits of the species of this genus. They are exceedingly rare in India and Burma, where I have collected.

Key to the Species.

A. Wings fuscous or fusco-hyaline.	
a. Abdomen yellow, basal margins of segments fuscous or ferruginous	*C. ornata*, p. 174.
b. Abdomen ferruginous, basal segment black	*C. fuscipennis*, p. 174.
B. Wings flavo-hyaline, apex fuscous.	
a. Abdomen reddish yellow, with rufo-fuscous transverse bands	*C. flavo-picta*, p. 175.
b. Abdomen yellow, with black transverse bands	*C. annulitarsis*, p. 175.
C. Wings hyaline.	
a. Head, thorax, and abdomen testaceous yellow, markings brighter yellow	*C. pernix*, p. 176.
b. Head and thorax black.	
a'. Markings on clypeus, sides of face, pronotum, and median segment white.	*C. albovariegata*, p. 176.
b'. Markings on clypeus, sides of face, and pronotum clear yellow	*C. claripennis*, p. 176.

345. **Ceropales ornata,** *Smith, Cat.* iii, p. 179, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 434.

"♀. Length 3½ lines" (8 mm.). "Head yellow, with a transverse fuscous line on the vertex. Thorax yellow; the mesothorax and base of the metathorax black or fuscous, the former has a yellow spot in the middle; the legs yellow, variegated with ferruginous stains; the wings fusco-hyaline. Abdomen yellow, the basal margins of the segments ferruginous; beneath pale ferruginous, sometimes the basal margins are fuscous, in other examples fusco-ferruginous.

"*Hab.* India (coll. W. W. Saunders)."

346. **Ceropales fuscipennis,** *Smith, Cat.* iii, p. 179, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 432.

"♀. Length 4 lines" (9 mm.). "Black, the orbits of the eyes slightly interrupted at their vertex, the clypeus, mandibles, and scape in front yellow: the basal half of the flagellum fulvous beneath. Thorax, the prothorax above, the tegulæ, and legs ferruginous: the coxæ and trochanters black, the apical joints of the

intermediate and posterior tarsi fuscous; wings subfuscous, nervures fuscous. Abdomen ferruginous, the basal segment black.

"*Hab.* India (coll. W. W. Saunders)."

347. **Ceropales flavo-picta,** *Smith, Cat.* iii, p. 178, ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 434.

"♂. Length 6 lines" (13 mm.). "Head yellow, having a ferruginous stain on the vertex and a fuscous spot before the ocelli; the antennæ ferruginous, their apex fuscous above; tips of the mandibles ferruginous. Thorax beneath and also the sides black; above reddish yellow; the anterior margin of the prothorax and a stripe passing over the tegulæ fuscous; the lateral margins of the metathorax fuscous; wings yellow, their extreme apex slightly fuscous; the legs pale ferruginous, the coxæ and trochanters fuscous. Abdomen reddish-yellow, the apical margins of the segments having rufo-fuscous fasciæ.

"*Hab.* India (coll. W. W. Saunders) *."

*348. **Ceropales annulitarsis,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 434.

♂. "Yellow, a stripe across the vertex behind the eyes, a broad one leading down from it on the front, with a small yellow mark on its centre, a broad band in front of the pronotum, from which an oblique one runs up the pleuræ, the mesonotum except along the sides, and a large squarish mark in the centre, this latter having a large black triangular mark in the centre, the mesonotum, a large oblique mark on the base of the mesopleuræ, the base of the scutellum, and the metanotum black; the greater part of the meso- and metapleuræ and the median segment reddish. Abdomen yellow, the 1st segment black at base and apex, the centre reddish; the 2nd segment black and red at apex, the 3rd broadly black; the 4th black at the apex, the black in the middle being continued to the base of the segment; the 5th black at the base, the black being continued in the middle to the apex; the ventral segments broadly black. Legs ferruginous; the coxæ yellow and red, the trochanters blackish, the apex of the hinder tibiæ and of the four hinder tarsal joints black. Wings yellowish hyaline, the apex of both wings infuscated; the 2nd cellule (cubital?) at the top and bottom longer than the 3rd; the 2nd and 3rd transverse cubital nervures elbowed at the middle, thus narrowing the 2nd cubital cellule at the top; the 1st recurrent nervure is received in the apical third, the 2nd a little before the middle. Antennæ ferruginous, longish, the joints curved; the 3rd and 4th joints subequal. Apex of clypeus bluntly rounded, the sides rounded. Head, pronotum, and median segments bearing long white hairs.

"Long 14 mm.

"*Hab.* Poona."

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* Whilst these pages have been passing through the press, I have, through the kindness of Prof. Poulton, been able to examine the types of *C. ornata*, *C. fusiformis*, and *C. flavo-picta*, all now in the Hope Museum, Oxford.

349. **Ceropales pernix**, *Bingh. Jour. Linn. Soc.* 1896, p. 425.

♂. Head, thorax, and abdomen smooth, slightly shining; head broad, broader than the thorax, labrum exserted, clypeus transverse anteriorly, slightly convex; antennæ stout, porrect; eyes convergent below, a deeply impressed vertical line from the anterior ocellus to between the base of the antennæ; pronotum short, its posterior margin widely arched; mesonotum with two parallel, medial, longitudinally impressed furrows; median segment long, rounded posteriorly, with a steep slope to its apex; legs long, the tibiæ and tarsi unarmed, nearly smooth; abdomen about as long as the thorax, slightly compressed laterally. Light testaceous brown, the clypeus, the inner margin of the eyes broadly, and the posterior margin of the pronotum pale yellow: wings hyaline and beautifully iridescent, the cubital and discoidal nervures produced to the apical margin of the fore wing, the transverse basal nervures interstitial; the tegulæ, stigma, and nervures brown.

Hab. Tenasserim. ♂. *Length* 8; *exp.* 15 mm.

350. **Ceropales albovariegata,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♂. Head, thorax, and abdomen smooth; head broad, the front only slightly convex, and the vertex nearly flat, the occiput transverse, a remarkable subcordate projection on the front above the base of the antennæ, the projection grooved down the middle or bilobed; mesonotum with two parallel well-marked longitudinal furrows; median segment rounded posteriorly, with a somewhat steep slope to the apex and a medial longitudinal furrow; abdomen short, slightly laterally compressed. Testaceous yellow; the head, pro- and mesonotum black; the clypeus, the sides of the face broadly, the projection above the base of the antennæ, the inner and outer orbits, the inferior lateral angles and posterior margin of the pronotum, three irregular spots beneath the wing on the pleuræ, a spot above the tegulæ, and the inferior apical lateral angles of the median segment, white; the scape in front testaceous yellow; the basal three joints of the flagellum of the antennæ beneath fulvous; wings hyaline and iridescent, the nervures and tegulæ testaceous.

Hab. Ceylon. ♀. *Length* 9; *exp.* 17 mm.

*351. **Ceropales claripennis,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 433.

"Black, shining, the mandibles, clypeus, face, orbits, except narrowly interrupted at the top, a line on the pronotum behind, the angles in front, a broad line at the apex of the mesonotum, a line on the scutellum, the metanotum, a narrow line down the middle of the median segment, the propleuræ beneath, a broad oblique line on the mesopleuræ above and two smaller ones on the lower half, and two large marks on the metapleuræ, clear yellow. Abdomen ferruginous, the extreme base black. Legs reddish, the fore coxæ yellow, with a black

mark behind; the four hinder coxæ black, yellow and red beneath, the tarsi black; the spurs pale, the hinder about two-thirds of the length of the metatarsus. Wings clear hyaline, the second cellule half the length of the third above and beneath; the 1st recurrent nervure received slightly past, the 2nd slightly in front of the middle of the cellules. Antennæ moderately thick, brownish beneath at the base; the third and fourth joints subequal. Eyes with a distinct curve at the top, distinctly converging at the apex, they being there separated by a little more than half the length they are at the top. Clypeus with the sides oblique, the apex transverse. Ocelli in a triangle, separated from the eyes by twice the length they are from each other. Pronotum semi-transverse, behind quadrate, the sides at the base projecting into triangular teeth. Mesonotum flattish, with two longitudinal furrows; the furrow on the mesopleuræ narrow; metanotum gibbous; median segment with a gradual slope. Except on the median segment the body is almost glabrous.

"*Length* 8–9 mm.

"*Hab.* Poona (*Wroughton*)." Unknown to me.

Genus **APORUS**.

Aporus, *Spinola, Ins. Lig.* ii, p. 35 (1808); *Smith, Cat.* iii, p. 174 (1855).

Pompilus, pt., *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 52 *et seq.*

Type, *A. unicolor*, Spin.

Range. Both hemispheres.

Head subglobose, about as wide as the thorax; ocelli in a triangle on the vertex; antennæ inserted about the middle of the face, not so long as the head and thorax united, filiform, slightly curved after death in the female; labrum concealed, clypeus subporrect; thorax convex above; scutellum minute, depressed below the level of the mesonotum; for the rest, the characters are those of *Pompilus*, except that in the fore wing there are only two cubital cells and that the anterior tarsi are not ciliated. The 2nd cubital cell receives both recurrent nervures.

Fig. 39. *Aporus cotesi*, ♀. $\frac{3}{1}$.

Note.—Kohl (*loc. cit.*) considers that the species of this genus are derived directly from *Pompilus* by the loss, in the fore wing, of the 2nd transverse cubital nervure, and that *Aporus* cannot be kept distinct from *Pompilus*. It is quite probable that the one genus has been evolved from the other in the way indicated by Kohl: still, as the distinctive character of two cubital cells in the fore wing seems to be constant, and generic distinction is a matter of convenience, I see no reason why *Aporus* should not be kept separate from *Pompilus*, so long as it is placed next to that genus and the relationship between the two is clearly understood.

Key to the Species.

A. Abdomen black.
  a. Fore wing hyaline, apex fuscescent........ *A. bengalensis*, p. 178.
  b. Fore wing fuscous, the basal, 1st cubital, 1st and base of 2nd discoidal cells with a narrow subapical band hyaline .... *A. orientalis*, p. 178.
B. Abdomen pale red, the apical segment fuscous. *A. cotesi*, p. 178.

352. **Aporus bengalensis,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 478.

♀. Head, thorax, and abdomen pruinose: the head convex in front, remarkably concave behind; pronotum long, its posterior margin transverse; median segment long with a rounded gradual slope, the apex obscurely longitudinally striated; legs with the tibiæ and tarsi very sparsely spinose; abdomen pseudosessile. Black, with obscure silvery pile, most dense on the clypeus and front and forming apical bands on the 1st and 2nd segments of the abdomen; wings hyaline, the fore wing lightly fuscous beyond the 2nd cubital cell, this latter is narrowed at the top and receives below both recurrent nervures.

Hab. Barrackpore, Bengal. ♀. *Length* 6; *exp.* 10 mm.

353. **Aporus orientalis.**

Planiceps orientalis, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 477, pl. iii, fig. 1.

♀. Head, thorax, and abdomen smooth and shining: the clypeus slightly convex, its anterior margin oblique at the sides, transverse in the middle: front flat, the ocelli widely separated, a short longitudinal notch behind the two posterior ocelli; pronotum rounded, two obscure tubercles in the middle anteriorly, the posterior margin regularly but very slightly arched: the scutellum very prominent; the median segment short, somewhat flat, the sides vertical, the apex steeply sloped; legs stout, the tibiæ and tarsi with thick short spines; abdomen pseudosessile, sharply acuminate at apex. Black; wings fuscous, in the fore wing the basal, the 1st cubital, 1st discoidal, base of 2nd discoidal, and a narrow band beyond the 3rd cubital and 2nd discoidal cells hyaline; in the hind wing the basal two-thirds are hyaline.

Hab. Barrackpore, Bengal. ♀. *Length* 15; *exp.* 27 mm.

354. **Aporus cotesi,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 478, pl. iii, fig. 2.

♀. Head, thorax, and legs densely pruinose, abdomen smooth; clypeus narrow, transverse, slightly convex, its anterior margin arched, front broad, with an abbreviated vertically impressed line above the base of the antennæ; pronotum rounded in front, narrowed towards the head, widely arched posteriorly; median segment long, smooth, rounded above, with a medial longitudinal shallow furrow; legs slender, the tarsi spinose, the tibiæ with very minute spines; abdomen long, as long as the head and

thorax together, subpetiolate, cylindrical, abruptly tapering at apex. Head and thorax black, covered with a dense hoary silvery pile, particularly dense on the clypeus, on the apex of the median segment, and legs; abdomen pale red, the apical segment fuscous; wings hyaline and iridescent, the fore wing fuscous at apex, the 1st recurrent nervure received just before the middle, and the 2nd recurrent nervure close to the apex of the 2nd cubital cell; nervures and tegulæ testaceous brown.

Hab. Barrackpore, Bengal; Ahmedabad, Western India. ♀. *Length* 9; *exp.* 17 mm. ♂ unknown. Type in collection Rothney.

Family SPHEGIDÆ.

The pronotum transverse, its lateral angles not prolonged back to the base of the wings.

The above is the sole constant character that separates this rather heterogeneous family from the other families of the Fossorial Hymenoptera.

In a limited fauna as that of Great Britain, for instance, it is possible to divide the Fossores into fairly well-marked groups, which can be conveniently regarded as forming families or sub-families; but all such limitations break down when exotic species are taken into consideration. It is therefore now generally held that the burrowing wasps with short prothoraces form only one family, containing genera, many of which have a tendency to form natural groups, while others stand more or less isolated.

Key to the Genera.

A. Fore wing with one cubital cell.
- *a*. Cubital cell confluent with 2nd discoidal cell .... OXYBELUS, p. 314.
- *b*. Cubital cell not confluent with 2nd discoidal cell .... CRABRO, p. 321.

B. Fore wing with two or three cubital cells.
- *a*. Abdomen pseudosessile, or if petiolate, petiole formed by the narrowing of both ventral and dorsal plates of first segment.
  - a'. Radial cell of fore wing appendiculate.
    - a^2. Prothorax very long, with posterior portion raised in the middle, leaving sides beneath narrowly projecting .... AMPULEX, p. 253.
    - b^2. Prothorax not so raised, pronotum short and transverse.
      - a^3. Mandibles incised on their outer margins.
        - a^4. Fore wing with three cubital cells.
          - a^5. Posterior femora with a hook or spine or tubercle at base .... PIAGETIA, p. 210.

b^5. Posterior femora simple.

a^6. Ocelli three, complete, round.

a^7. Base of 1st abdominal segment narrowed, subpetiolate .... LYRODA, p. 208.

b^7. Base of 1st abdominal segment not narrowed, pseudosessile.

a^8. Margins of abdominal segments constricted ...... PALARUS, p. 213.

b^8. Margins of abdominal segments not constricted.

a^9. Eyes with their inner margins arched outwards .... LIANTHRENA, [p. 212.

b^9. Eyes with their inner margins not arched, straight, converging towards the vertex .... ASTATA, p. 182.

b^6. Ocelli more or less distorted and incomplete.

a^7. Pygidial area bare, not pubescent.

a^8. Pronotum posteriorly on a level with mesonotum.... LARRA, p. 195.

b^8. Pronotum depressed beneath the level of mesonotum .. TACHYSPHEX, [p. 192.

b^7. Pygidial area pubescent.

a^8. Median segment much longer than mesonotum .... NOTOGONIA, [p. 201.

b^8. Median segment equal in length to mesonotum, or shorter .... TACHYTES, p. 185.

b^4. Fore wing with two cubital cells .. GASTROSERICUS, [p. 216.

b^3. *Mandibles not incised on their outer margins.*

a^4. Pygidial area pubescent .... LIRIS, p. 205.

b^4. Pygidial area not pubescent........ PARALIRIS, p. 208.

b'. Radial cell of fore wing not appendiculate.

a^2. Fore wing with two cubital cells.

a^3. Inner orbits not emarginate .... MISCOPHUS, [p. 215.

b^3. Inner orbits emarginate.

a^4. Outer nervures of 2nd (prop. 3rd) cubital cell distinct .... PISON pt., p. 217.

b^4. Outer nervures of 2nd cubital cell so fine as only to be made out with some difficulty .... TRYPOXYLON, [p. 222.

b^2. Fore wing with three cubital cells.

a^3. Inner orbits emarginate .... PISON pt., p. 217.

b^3. Inner orbits not emarginate.

a^4. Median segment long, flat above, with several longitudinal carinæ.

a^5. Median segment above not broadened laterally; colour black .... DOLICHURUS, [p. 259.

b^5. Median segment above broadened out laterally; colour deep cærulean blue .... TRIROGMA, p. 260.

b^4. Median segment not particularly long, not flat above nor carinated.
a^5. Labrum very much lengthened and exserted beneath clypeus.
a^6. Labrum sharply acute at apex, rostriform .... BEMBEX, p. 284.
b^6. Labrum rounded at apex, not rostriform .... STIZUS, p. 276.
b^5. Labrum short, not or very inconspicuously exserted beneath clypeus.
a^6. The 2nd cubital cell receiving both recurrent nervures.
a^7. The 2nd cubital cell petiolate; median segment with lateral tubercles or spines .... NYSSON, p. 268.
b^7. The 2nd cubital cell not petiolate; median segment without lateral tubercles or spines .. GORYTES, p. 271.
b^6. The 1st cubital cell receiving the 1st, the 2nd cubital cell the 2nd recurrent nervure .... HELIORYCTES, [p. 270.
c^6. The 2nd cubital cell receiving the 1st, the 3rd cubital cell the 2nd recurrent nervure.
a^7. 2nd cubital cell petiolate .... CERCERIS, p. 299.
b^7. 2nd cubital cell not petiolate .... PHILANTHUS, [p. 293.
b. Abdomen petiolate, petiole composed of ventral plate only of basal abdominal segment.
a'. Intermediate tibiæ with two apical spurs.
a^2. Second and third cubital cells in fore wing each receiving a recurrent nervure .... SPHEX, p. 241.
b^2. Second cubital cell in fore wing receiving both recurrent nervures.
a^3. Anterior tarsi ciliated exteriorly ...... AMMOPHILA, [p. 228.
b^3. Anterior tarsi not ciliated exteriorly .. SCELIPHRON, [p. 235.
b'. Intermediate tibiæ with one apical spur.
a^2. Three cubital cells in fore wing .... PSEN, p. 262.
b^2. Two cubital cells in fore wing.
a^3. With one recurrent nervure in fore wing .... STIGMUS, p. 266.
b^3. With two recurrent nervures in fore wing.
a^4. Petiole long, longer than succeeding abdominal segment .... PEMPHREDON, [p. 265.
b^4. Petiole short, shorter than succeeding abdominal segment .... PASSALŒCUS, [p 267.

Genus ASTATA.

Astatus, *Latr. Précis Caract. Gen. Ins.* p. 114 (1796).
Astata, *Latr. Hist. Nat. Crust. et Ins.* t. iii, p. 336 (1802).
Dimorpha, *Panz. Krit. Revis. Faun. Deutschl.* ii, p. 126 (1806).
Dryudella, pt., *Spin. Ann. Soc. Ent. Fr.* 1843, t. i, p. 135.

Type, *A. boops*, Schrank.

Range. Both hemispheres.

Head wider than the thorax; mandibles not emarginate or incised on their outer margins, bluntly toothed on the inner side close to the apex; eyes very large, strongly convergent at top, in the ♂ meeting on the central line of the vertex; ocelli complete, round, placed in a triangle below the vertex; antennæ filiform, inserted low down on the front, just above the clypeus; pronotum depressed below the level of the mesonotum; legs thick, the tibiæ and tarsi (♀) thickly, (♂) less densely spinose, intermediate tibiæ with two apical spurs; abdomen short, somewhat cordate or conical in shape, in the ♂ flattened above. Wings with one radial and three cubital cells, the former long, narrow, roundly truncate at apex and appendiculate; the 1st cubital cell obliquely oval, divided transversely by an obsolete or nearly obsolete nervure; 2nd cubital cell subtriangular, receiving both recurrent nervures; 3rd obliquely quadrate, the opposite sides nearly parallel.

Fig. 40.—*Astata agilis*, ♂. $\frac{2}{1}$.

The large eyes and short conical abdomen of these insects make them closely resemble, in form, certain kinds of Diptera. *Astata* is eminently a sand-wasp, burrowing in hard sandy banks and storing its nests with larvæ of various species of Hemiptera; and the late Mr. F. Smith records having seen the English species of *A. boops* conveying to its nest specimens of an allied hymenopterous insect, *Oxybelus*.

Key to the Species.

A. Abdomen wholly black .... *A. nigricans*, p. 183.
B. Abdomen red and black.
  a. Of comparatively large size (L. 10–13 mm.); mesonotum anteriorly carinated and furrowed .... *A. orientalis*, p. 183.
  b. Smaller (L. 7–10 mm.); mesonotum simple.
    a′. Median segment above enclosed by lateral convergent furrows .... *A. maculifrons*, p. 183.
    b′. Median segment not furrowed laterally.
      a². Median segment long, finely longitudinally reticulate .... *A. agilis*, p. 184.
      b². Median segment comparatively short, coarsely reticulate .... *A. tarda*, p. 184.

355. **Astata nigricans,** *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 151, ♂.

♂. Head, thorax, and abdomen thinly pubescent, the pubescence denser on the sides of the face and sides and apex of the median segment; eyes strongly convergent and meeting on the vertex; the front convex, punctured, the anterior ocellus large, twice the size of the posterior ones, on the front beneath it an obscure T-shaped furrow; pro- and mesonotum, scutellum, and post-scutellum rather closely punctured, the disc of the scutellum smooth and shining; median segment long, slightly narrowed and sloping posteriorly; the apex truncate, above coarsely reticulate, with a medial longitudinal carina; abdomen shining, minutely punctured, the margins of the segments slightly depressed. Black, the pubescence hoary white, silvery on the sides of the face; the tarsi and the posterior margins of the basal five segments bronzy testaceous; wings hyaline and iridescent, nervures pale testaceous, tegulæ black.

Hab. Poona, Bombay Presidency. ♂. *Length* 8–9; *exp.* 16 mm. Type in coll. Rothney.

356. **Astata orientalis,** *Smith, Cat.* iv, p. 310; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 150.

♂. Head above the base of the antennæ coarsely rugose and covered with thin long pubescence; the cheeks and occiput smooth, with soft thin pubescence; mesonotum, scutellum, and post-scutellum very minutely and closely punctured; the mesonotum anteriorly with two parallel, abbreviated, longitudinal carinæ, terminating posteriorly in minute tubercles, and two parallel, abbreviated, longitudinally impressed lines in the space between the carinæ; scutellum impunctate, smooth, and shining in the middle; median segment long, rounded at the sides, concavo-truncate posteriorly, the truncation punctured, above coarsely reticulate; abdomen smooth, opaque, the basal segment at apex strongly constricted. Black, the posterior margin of the 1st and 2nd abdominal segments entirely ferruginous red, the remaining segments more or less dark fusco-ferruginous; wings flavo-hyaline, sometimes entirely hyaline.

Var. With the basal two and basal half of the 3rd segment red.

Hab. Nishchindeepore, Bengal; Tenasserim. ♂. *Length* 10–13; *exp.* 18–23 mm.

357. **Astata maculifrons,** *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 149, ♂.

♂. Head—the clypeus produced in the middle at apex, deeply depressed at the sides, front convex, punctured, the punctures close above the ocelli; eyes strongly obliquely convergent, meeting above on the vertex; cheeks smooth, shining; mesonotum, scutellum, and postscutellum shining, sparingly punctured; median segment as long as the rest of the thorax, truncate posteriorly, rounded towards the sides; above divided off by two deep furrows,

one on each side, meeting below the edge of the truncation in a small depression, the enclosed space coriaceous, with a medial longitudinal faintly-marked carina, the sides and truncated portion of the segment rugose-punctate; abdomen smooth, shining, with a few scattered delicate punctures. Black, the front below the ocelli with a transverse yellow mark rounded at the sides, emarginate in the middle anteriorly; abdomen with the basal three segments and sides of the 4th red above; the head, thorax, and abdomen covered with a very spare, soft, erect fuscous pubescence; wings hyaline, the fore wing anteriorly light fuscescent; nervures testaceous, tegulæ yellow.

Hab. Mussooree. ♂. *Length* 9; *exp.* 17 mm. Type in coll. Rothney. This is the Eastern representative of the British *A. stigma.*

358. **Astata agilis,** *Smith, Trans. Ent. Soc.* 1875, p. 39, ♀; *Kohl, Verh. zool.-bot. Ges. Wien,* 1884, p. 447; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 150.

♀. Head—the clypeus, the cheek and occiput, the pronotum, the sides and apex of the median segment, the coxæ and femora of the legs, and the base of the abdomen covered with a long thin soft pubescence; the head in front closely punctured and bearing a medial short vertical furrow in front of the anterior ocellus; pro- and mesonotum less closely punctured; the scutellum large, prominent, smooth and shining; the median segment long, truncate at apex; above and at base longitudinally reticulate, and bearing a fine medial longitudinal carina; abdomen broad, short (very short and subcordate in shape in the ♂), acutely pointed at apex, very minutely and closely punctured at the bases of the segments. Black, the apical margin of the 1st, the whole of the 2nd, and the base narrowly of the 3rd abdominal segment red; wings hyaline, with a faint fuscous cloud beyond the stigma, the apex pale; nervures and tegulæ testaceous.

♂ similar but smaller, more pubescent.

Var. The fore wing flavo-hyaline from base to apex of radial cell, hyaline beyond.

Hab. Nishchindeepore; Tirhoot; Poona; Sikhim; Tenasserim. ♀. *Length* $7\frac{1}{2}$–9; *exp.* 14 mm. ♂. *Length* 7–8; *exp.* 14 mm.

359. **Astata tarda,** *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♂. Closely resembles *A. agilis,* Smith, from which it can be distinguished by being much more finely and closely punctured and larger. Head in front, pro- and mesonotum, scutellum and post-scutellum finely and closely punctured; median segment coarsely reticulate, above the apex truncate; the head in front, the pronotum, apex of the median segment, and base of abdomen covered with a soft long thin silvery pubescence. Black, the apical margin of the 1st, the whole of the 2nd, and the basal half of the 3rd abdominal segment red; wings hyaline, very faintly fuscous on the apical margin; nervures and tegulæ dark brown.

Hab. Ceylon. ♂. *Length* 10; *exp.* 18 mm. Type in coll. Rothney.

Genus **TACHYTES.**

Sphex, pt., *Fabr. Ent. Syst.* ii, p. 215 (1793).
Pompilus, pt., *Fabr. Ent. Syst. Suppl.* p. 251 (1798).
Larra, pt., *Fabr. Syst. Piez.* p. 221 (1804).
Tachytes, *Panz. Krit. Revis. Faun. Deutschl.* ii, p. 129 (1806).
Lyrops, pt., *Latr. Gen. Crust. Ins.* iv, p. 71 (1809)

Type, *T. pompiliformis*, Panz.
Range. Both hemispheres.

Head wider than the thorax; mandibles with a narrow incision on their outer margin close to the middle; the inner margin bidentate; clypeus and face always densely pilose or pubescent; antennæ stout, and generally shorter than in the genus *Tachysphex*; eyes, especially in the ♂, strongly convergent towards the vertex, but never quite meeting as in the ♂ of *Astata*; the ocelli are placed on a convexity on the front, the anterior ocellus round, the posterior elongate, almost reniform, slanting, flat, and less distinct; pronotum depressed beneath the level of the mesonotum; pygidial area distinct, in the ♀ triangular, in the ♂ generally trapezium-shaped, but in both always pubescent, in the ♀ set with dense, short, stiff hairs, in the ♂ with sparser pubescence. Wings stout, ample; fore wing with one radial and three cubital cells, the radial cell lengthened and acute at apex, and only feebly truncate, showing in consequence only an indistinct appendicular cell. Legs—the tibiæ and tarsi of all the legs more or less spinose, the tarsal combs altogether much shorter and stouter than in *Tachysphex*.

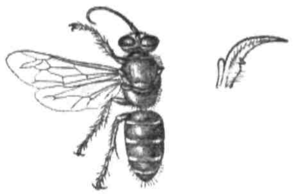

Fig. 41.
Tachytes saundersii, ♀. $\frac{1}{1}$.

Tachytes contains some of the most beautiful of the species of sand-wasps. Many of the Oriental forms are black, or black and red, richly decked with golden or silvery pubescence and pile. All the Indian species whose habits I have been able to investigate nest in the ground, and store their nests with the larvæ of *Orthoptera*.

Key to the Species.

A. Abdomen red, or red and black.
  a. Transverse pilose bands on abdomen golden.
    a'. Fore wing with a subapical fuscous fascia. — ***T. yerburyi***, p. 186.
    b'. Fore wing with no subapical fascia .... — ***T. fervida***, p. 186.
  b. Transverse pilose bands on abdomen silvery.
    a'. Fore wing with apex broadly dark fuscous .... — ***T. conspicua***, p. 187.
    b'. Fore wing with no apical fuscous border.
      a². Femora, tibiæ, and tarsi of legs red .. — ***T. erythropoda***, p. 187.
      b². Femora, tibiæ, and tarsi of legs black . — ***T. tarsata***, p. 188.

B. Abdomen black.
- *a.* Pile on abdomen golden .... *T. monetaria*, p. 188.
- *b.* Pile on abdomen silvery.
  - *a'.* Of comparatively large size: over 16 mm. in length.
    - a^2. Thorax with fuscous or rufo-fuscous pubescence .... *T. saundersii*, p. 189.
    - b^2. Thorax with yellow or golden pubescence .... *T. sinensis*, p. 189.
  - *b'.* Of comparatively small size: under 15 mm. in length.
    - a^2. Legs more or less testaceous red.
      - a^3. Form short, robust; all tibiæ and tarsi testaceous red .... *T. modesta*, p. 190.
      - b^3. Form more slender; tibiæ and tarsi of anterior and tarsi only of intermediate and posterior legs testaceous red............................ *T. ornatipes*, p. 190.
    - b^2. Legs black.
      - a^3. Pygidial area covered with black pubescence .... *T. nitidula*, p. 190.
      - b^3. Pygidial area covered with silvery pubescence.
        - a^4. Length 13–14 mm. .... *T. vicina*, p. 191.
        - b^4. Length 7–9 mm. .... *T. vishnu*, p. 191.

360. **Tachytes yerburyi**, n. sp.

♂. Clypeus, the region of the ocelli, and the vertex of the head finely and closely punctured; the anterior margin of the clypeus narrowly smooth and recurved: eyes strongly convergent above, nearly meeting; the front and clypeus densely pubescent; thorax finely and closely punctured, and with the abdomen above thinly pubescent; median segment short, rounded posteriorly; the apex steeply sloped, a medial longitudinally impressed line widening on the verge of the posterior slope into an oval fovea. Black, the mandibles at base, the apex of the clypeus, the scape and basal eight joints of the flagellum of the antennæ, the legs except the base of the coxæ, and the basal four or five segments of the abdomen, light testaceous red; the pubescence rich golden, forming shining transverse bands on the margins of segments 1–6 of the abdomen above; wings fulvo-hyaline, the apical and posterior margins lighter; in the fore wing a dark fuscous cloud occupies the radial, descending slightly into the 2nd and 3rd cubital cells.

Hab. Ceylon. ♂. *Length* 17; *exp.* 32 mm. ♀ unknown. Type in British Museum.

361. **Tachytes fervida**, *Smith, Cat.* iv, p. 298, ♀.

♀. Closely allied to and resembling *T. tarsata*, Smith, but is a broader, stouter-built insect, the median segment proportionately not so long; the apical margin of the clypeus is narrowly depressed and rounded; the head above is not furrowed, and the eyes are slightly more convergent towards the vertex. Head, thorax,

median segment, and apical three segments of the abdomen black; the tegulæ of the wings, the legs, and the basal three abdominal segments red; the whole insect covered with a rich glittering golden pile, forming tesselated transverse bands on the apical margins of the abdominal segments; wings light flavo-hyaline, nervures testaceous.

Hab. India (*Smith*). ♀. *Length* 14; *exp.* 26 mm.

362. **Tachytes conspicua.**

Larrada conspicua, *Smith, Cat.* iv, p. 276, ♀.
Larra conspicua, *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 242; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 125.

♀. Head and thorax pruinose; abdomen smooth, dull and opaque; the clypeus rounded in front, the extreme anterior margin narrowly smooth; the front with a medially impressed line leading down from the anterior ocellus, two slight lateral hollows, one on each side of the line, and a shallow pit behind the posterior ocelli; median segment long, rather compressed, steeply sloped posteriorly, above transversely striate and covered with soft, short, thin pubescence; abdomen narrow, the apical segments narrowing acutely to the apex. Black; the mandibles, the scape of the antennæ in front, the femora, tibiæ, and tarsi of all the legs, the basal two and the apical segments of the abdomen red; the clypeus and front, and the posterior margins of abdominal segments 1–5 clothed with dense silvery pile, the pygidial area studded with a thin yellowish pubescence; wings hyaline, yellow at base, broadly pubescent along the apical margins.

Hab. Barrackpore, Bengal (*Smith*). ♀. *Length* 13; *exp.* 22 mm.

This is quite an aberrant species, having affinities to *Larra* and *Tachysphex*; it has the front and the median segment of the former, while the armature of the fore tarsi is that of *Tachysphex*, but the pygidial area is pubescent and the general appearance that of a *Tachytes*.

363. **Tachytes erythropoda,** *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 135, ♀.

♀. Head broader than the thorax, sparsely punctured, thorax and abdomen smooth and shining; the vertex sparsely, the clypeus, front, cheeks, sides of the thorax, the median segment above and on the sides and apex, and the abdomen densely pubescent; clypeus transverse, its anterior margin slightly recurved; vertex marked with a shallow **V**-shaped furrow; mesonotum anteriorly with two parallel abbreviated impressed lines; median segment above indistinctly transversely striate, the sides obliquely. Black; the mandibles, the femora, tibiæ and tarsi of the legs, and the basal three segments of the abdomen red; the pubescence glittering silvery white, forming transverse bands on the apical margins of the abdominal segments; pygidial area clothed with

dense short fulvous pubescence; wings hyaline, very slightly fuscescent towards the apex, nervures and tegulæ pale testaceous.

Hab. Mussooree. ♀. *Length* 8; *exp.* 16 mm.

364. **Tachytes tarsata**, *Smith, Cat.* iv, p. 297, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 141; *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 409.

Larrada vestita, *Smith, A. M. N. H.* (4) xii, 1873, p. 293, ♀.

Tachytes basalis, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 142.

♀. Head and thorax closely and finely punctured and pubescent, the pubescence dense on the clypeus, the mesonotum, postscutellum, and the sides and apex of the median segment (in some specimens, *e. g.* the type, the pubescence is very dense; in others, *e. g.* type of *T. basalis*, thin and sparse); front of head with a medial broad shallow furrow meeting a deep Λ-shaped furrow behind the ocelli; median segment rounded above, truncate posteriorly, the face of the truncation obscurely transversely striate and bearing a medial, short, vertical furrow. Black; the basal three, sometimes four segments of the abdomen red, the pubescence shining silvery, the apical margins of segments 1–5 with bands of glittering silvery pile having more or less of a tesselated appearance in certain lights; the pygidial area covered with a stiff short ferruginous, sometimes golden pubescence; wings clear hyaline, in a few specimens tinged with a very light yellow; nervures and tegulæ pale testaceous. The colour of the legs varies from fuscous to black.

♂ similar; the pubescence on the pygidium silvery.

Hab. North-West Provinces; Tirhoot; Barrackpore. ♀. *Length* 15; *exp.* 27 mm. ♂. *Length* 12; *exp.* 23 mm.

365. **Tachytes monetaria**, *Smith, Cat.* iv, p. 298, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 136; *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 404.

Tachytes velox, *Smith, Cat.* iv, p. 301, ♂.

♀. Head and thorax very finely and closely punctured, the punctures on the median segment above with a tendency to run into transverse striæ; head in front and on the clypeus and cheeks densely pubescent; median segment clothed sparingly with short soft hairs; legs pruinose; abdomen with a dense matting of sericeous pile; median segment rounded posteriorly, with a medial longitudinal furrow reaching the apex and anteriorly continued obscurely over the scutellum and postscutellum. Black, the pubescence silvery; on the abdomen a rich ferruginous golden having a beautiful tesselated appearance in certain lights, the basal two-thirds of the 1st segment of the abdomen black; wings fusco-hyaline, darker along the apical margin.

♂ similar, but much smaller, the wings with a distinct yellow tint, the posterior pair hyaline.

Hab. Throughout India, and extending eastwards to Africa as

far as the Gambia. ♀. *Length* 20; *exp.* 32 mm. ♂. *Length* 16; *exp.* 32 mm.

366. **Tachytes saundersii**, n. sp.

♀. Head—the eyes strongly convergent above, the front and clypeus densely, the base of the mandibles and the cheeks thinly pubescent; the vertex punctured, divided by a conspicuously impressed longitudinal line ending in a deep semicircular furrow behind the posterior ocelli; thorax with a short, moderately dense pubescence, the surface underneath very minutely and closely punctured, giving it an opaque velvety appearance; median segment slightly more coarsely punctured, with a medial longitudinally impressed line from base ending in a shining subtriangular fovea on the verge of the rounded posterior portion of the segment; legs densely pilose; abdomen shining, the dorsal surface obscurely aciculate; the posterior margins of abdominal segments 1–4 above with transverse broad bands of silky pile; pygidial area large, clothed with dense stiff pubescence. Intense black; the pubescence on the head and the dense pile on the tibiæ and tarsi of the legs of a rich glittering golden colour, on the thorax and median segment it is fuscous black, with a rufous tint in certain lights; the bands on the abdomen are silvery and the stiff hair on the pygidial area, with the tibial calcaria and spines on the legs, ferruginous; wings flavo-hyaline, with a rich golden effulgence in certain lights.

♂ similar but smaller; the tibiæ and tarsi of the anterior and intermediate legs, and the femora, tibiæ, and tarsi of the posterior legs reddish; the pubescence on the pygidial area silvery.

Var. The legs entirely black.

Hab. Tenasserim. ♀. *Length* 20; *exp.* 41 mm. ♂. *Length* 15–17; *exp.* 32–35 mm.

367. **Tachytes sinensis**, *Smith, Cat.* iv, p. 299, ♀; *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 407.

Tachytes rothneyi, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 139.

♀. Head and thorax densely pubescent, the pubescence long and silky on the clypeus, the face in front, and the median segment, short, thick, and close on the pro- and mesonotum, the pleuræ, and legs; on the scutellum, which is large and prominent, it is rather thin and fine; the surface of the head and thorax under the pubescence closely and finely punctured; median segment short, abruptly and steeply rounded posteriorly, with a fine medial longitudinal furrow at apex not extending to the base of the segment; abdomen smooth and shining, with transverse pilose bands, which widen laterally on the apical margins of the basal 3 (sometimes basal 4) segments; pygidial area large, densely pubescent. Black, the spines, calcaria, and claws of the legs pale ferruginous; the pubescence on the head and thorax golden yellow, the transverse bands on the basal segments of the abdomen silvery, the short stiff pubescence on the pygidial area ferruginous; wings flavo-hyaline, nervures and tegulæ rufo-testaceous.

Var. The mandibles, and the femora, tibiæ, and tarsi of the legs rufo-testaceous, the pubescence on the head and thorax rich ferruginous; wings with a deep golden tint.

♂ similar, but the pygidial area covered with short silvery pubescence.

Hab. Sikhim; Barrackpore; Tenasserim; North China. ♀. *Length* 17–19; *exp.* 35–39 mm. ♂. *Length* 18; *exp.* 36 mm.

368. **Tachytes modesta,** *Smith, Cat.* iv, p. 299, ♀; *Kohl, Verh. zool.-bot. Ges. Wien,* 1884, p. 404; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 136.

♀ ♂. Head—the vertex with some shallow scattered punctures; thorax very finely and closely punctured, abdomen shining; the clypeus, face in front, the cheeks behind the eyes, the pronotum, sides and apex of the mesonotum, postscutellum, and median segment with more or less dense pubescence, long and very close on the clypeus and the sides of the median segment; abdomen thinly pubescent, with transverse bands of glittering pile on the apical margins of the basal four segments; pygidial area covered with dense and stiff (♀) or sparse (♂) pubescence. Black, the pubescence on the head and thorax pale golden, the transverse bands on the abdomen and the stiff hairs on the pygidial area silvery; the apical half of the femora, the tibiæ and tarsi testaceous red; wings hyaline, with a faint yellow tinge.

Fig. 42.—*Tachytes modesta*, ♂. $\frac{3}{2}$.

Hab. Mussooree (N.W.P.); Sikhim; Burma; Tenasserim; China. ♀ ♂. *Length* 11–15; *exp.* 23–28 mm.

369. **Tachytes ornatipes,** *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 137.

♂. Very closely allied to *T. modestus*, Smith; differs in the body, especially the abdomen, being longer and more slender, in the colour of the legs, which are black, the tibiæ and tarsi of the anterior and the tarsi of the intermediate legs only being testaceous, and the tibiæ of the intermediate and the tibiæ and tarsi of the posterior legs fusco-testaceous; the wings in *T. ornatipes*, too, are, on the whole, somewhat lighter in colour than in *T. modestus*.

Hab. Barrackpore, Bengal. ♂. *Length* 12; *exp.* 22 mm. Type in coll. Rothney.

370. **Tachytes nitidula.**

Crabro nitidulus, *Fabr. Ent. Syst.* ii, p. 294.

Tachytes nitidula, *Dahlb. Hym. Eur.* i, p. 470, ♂; *Kohl, Verh. zool.-bot. Ges. Wien,* 1884, p. 404.

Tachytes nitidulus, *Smith, Cat.* iv, p. 298; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 141.

♀. Head opaque, the vertex sparsely punctured, a deep

Λ-shaped narrow groove behind the ocelli; thorax finely and very closely punctured; the head and thorax pubescent, densely so on the clypeus and front of the face and on the median segment laterally and at apex, the last somewhat more coarsely punctured than the mesonotum; abdomen with the surface finely aciculate (pilose in some specimens), and dense pubescent bands on the apical margins of segments 1–4. Black, the pubescence soft and silvery, that on the pygidial area black and stiff; wings hyaline, with a very light yellowish tinge; nervures and tegulæ testaceous.

♂ similar, but the pubescence brighter, and the bands on the abdomen broader.

Hab. Punjab; Delhi; Allahabad; Barrackpore; Madras; Burma; Tenasserim. ♀ ♂. *Length* 12–14; *exp.* 22–26 mm.

371. **Tachytes vicina**, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 140, ♂.

♂. Head and thorax closely and finely punctured, pruinose, median segment opaque, the punctures dense with a tendency to run into transverse striæ, especially at the apex; the segment is about the length of the mesonotum and is roundly truncate posteriorly, with a shining central oval fovea at the verge of the truncation above; abdomen pruinose, with dense pilose transverse bands on the posterior margins of the 1st to 4th segments above, the pygidial area densely pubescent. Black, the pubescence on the head and face, the median segment, and legs soft whitish grey, slightly fuscous on the vertex of the head; on the clypeus, on the sides and apex of the mesonotum, and on the apical bands of the abdominal segments it is silvery; wings flavo-hyaline, nervures and tegulæ testaceous.

♀ similar, slightly larger.

Hab. Tirhoot, Bengal; Burma. ♀. *Length* 15; *exp.* 28 mm. ♂. *Length* 13; *exp.* 25 mm.

372. **Tachytes vishnu.**

Tachytes virchu (laps. cal.), *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 138, ♂.

♂. Head, thorax, and abdomen densely pubescent, very minutely and closely punctured under the pubescence; clypeus with the anterior margin depressed, narrowly smooth and shining; vertex with a shallow depression, the ocellar region raised slightly, with a fine vertical furrow continued down the front from the anterior ocellus; median segment not so long as the mesonotum, narrow posteriorly, the apex truncate, with a shining vertical furrow, the sides, top, and face of the truncated apex finely transversely striate. Black, dull and opaque, the posterior femora red, the posterior tibiæ rufo-fuscous; the pubescence on the front and the clypeus silvery with a distinct fulvous tint, that on the thorax hoary white; on the abdomen the pubescence forms broad silvery bands on the apical half of the segments, the base of the 2nd segment with a very thin short pubescence having a reddish tint

and the transverse pilose bands on the abdomen; these latter and the pubescence on the front of the head and clypeus brilliantly silvery in certain lights; legs black, the tarsi and tibial calcaria testaceous, in marked contrast with the upper part of the legs; wings hyaline and iridescent; nervures and tegulæ pale testaceous.

Hab. Tenasserim. ♂. *Length* 7–9; *exp.* 11–14 mm. Type in the British Museum.

A true *Tachysphex*; the anterior femora conspicuously emarginate at base.

375. **Tachysphex auriceps**, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 145, ♀ ♂.

♀. Head densely, thorax more sparsely pubescent, the pubescence longer and most dense on the clypeus, the front and sides of the median segment; head and thorax finely and closely punctured; ocellar area raised, longitudinally furrowed, the furrow produced backward on to the vertex and forward on the front; behind the ocelli there is also a well-marked Λ-shaped furrow; clypeus slightly produced anteriorly, arched; median segment punctured, rugose, the apex transversely striate. Black, the pubescence golden; the apex of the femora, the tibiæ and tarsi, and the basal two segments of the abdomen red, the apical margins of the 1st to 5th segments with transverse medially interrupted bands of glittering silvery pile; wings light flavo-hyaline, tegulæ and nervures testaceous.

♂ similar, the pubescence more dense, the eyes above more convergent, the basal segments of the abdomen shaded with black.

Hab. Bombay; Bangalore; Ceylon. ♀. *Length* 11–12; *exp.* 21–23 mm. ♂. *Length* 9–10; *exp.* 20 mm.

376. **Tachysphex argyreus.**

Larrada argyrea, *Smith, Cat,* iv, p. 276, ♂ (*non* ♀).

Tachysphex argyrea, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 143.

♀. Head and thorax pubescent, finely and closely punctured under the pubescence, the eyes strongly convergent at the vertex; clypeus with the anterior margin broadly rounded; median segment very closely and minutely punctured, roundly truncate posteriorly, bearing above an abbreviated medial longitudinal groove not reaching the base, but continued over the truncate posterior face of the segment nearly to the apex; legs with long thin pubescence; abdomen dull and opaque, the surface above finely aciculate. Black, the pubescence silvery white, mandibles ferruginous; legs with the tibiæ and tarsi rufo-testaceous; abdomen red, the margins of the segments with broad obscure bands (interrupted along the median line) of silvery pile; wings hyaline, iridescent.

Var. With the clypeus reddish, the 3rd–5th segments posteriorly fuscous.

♂ similar, but with the pubescence and silvery pile more dense, the eyes more convergent at the vertex, and only the basal three and the apical abdominal segments red.

Hab. North-West Provinces : Mussooree, 7000 ft. ♀. *Length* 12 ; *exp.* 22 mm. ♂. *Length* 9 ; *exp.* 14 mm.

377. **Tachysphex erythrogaster,** *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 143, ♀.

♀. Head and thorax pubescent, rugosely punctured underneath the pubescence ; clypeus truncate anteriorly, the sides oblique, labrum incised ; ocellar area raised, broadly furrowed down the middle ; median segment with a furrow at apex : abdomen with transverse bands of silky pile on the apical margins of the 1st–5th segments above. Black, the head and thorax covered with dense silvery pubescence ; the scape of the antennæ, the clypeus, legs, and the abdomen red, the transverse pilose bands on the last silvery ; wings hyaline, nervures brown, tegulæ pale reddish.

Hab. Bombay ; Bangalore. ♀. *Length* 13 ; *exp.* 25 mm.

378. **Tachysphex rufo-niger,** n. sp.

♀. Head and thorax closely and very minutely punctured, the face, clypeus, and cheeks more or less densely pilose, the vertex with a Λ-shaped furrow behind the posterior ocelli, the mesonotum, scutellum, and postscutellum slightly shining ; the median segment above finely and transversely and on the sides obliquely striate, the apex roundly truncate and with the sides slightly pubescent ; abdomen long, longer than the head and thorax united, segments 1–5 with transverse bands of silky pile on their posterior margins ; pygidial area large, bare, and sparsely punctured. Black, the basal three abdominal segments red, the apical third of the 3rd segment with a fuscous band, the 4th and 5th with their apical margins narrowly testaceous ; legs black, with the apical three joints of the tarsi reddish ; the silky pile on the head and on the abdomen has a silvery lustre in certain lights ; wings very light fusco-hyaline.

Hab. North-West Provinces. ♀. *Length* 9–10 ; *exp.* 16 mm. ♂ unknown. Type in British Museum.

Genus LARRA.

Larra, *Latr. Précis Caract. Gen. Ins.* p. 116, 17 gen. (1796).
Liris, *Illig. Edit. Faun. Etrusc.* ii, p. 101 (1807).
Tachytes, pt., *Lepel. Hym.* iii, p. 239 (1845).
Larrada, pt., *Smith, Cat.* iv, p. 274 (1856).
Larra, *Kohl, Verh. zool.-bot. Ges. Wien,* 1884, p. 65.

Type, *L. anathema*, Rossi.
Range. Both hemispheres.

Head very little wider than the thorax; mandibles emarginate near the middle of the outer margin, apex of the mandibles simple, not dentate; eyes slightly convergent towards the vertex; ocelli irregular, the anterior being normal, the posterior two more or less ill-formed or obsolete; pronotum transverse posteriorly, not, or scarcely at all, depressed below the level of the mesonotum; fore wing with one radial and three cubital cells, the radial cell appendiculated: the first cubital cell equal in length to the 2nd and 3rd united; the 2nd and 3rd much narrowed above towards the radial cell; 2nd often almost triangular; the 3rd elongate, rather tongue-shaped; legs short and stout, the intermediate tibiæ with one spur, the claws not particularly slender or long; abdomen with the 2nd ventral segment normal, not convexly raised in the middle; the pygidial area well-marked, bare, without pubescence, punctured.

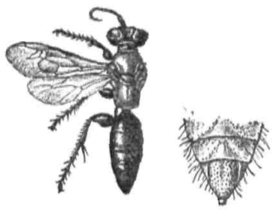

Fig. 44.
Larra carbonaria, ♀. 1/1.

Key to the Species.

A. Abdomen more or less red.
- *a*. Front of head with a prominent raised transverse margin or ridge .... *L. fuscipennis*, p. 197.
- *b*. Front sulcate without any transverse margin.
  - *a'*. Median segment very finely and densely punctured, the punctures running into striæ: posterior wing clear hyaline along its posterior margin .... *L. sumatrana*, p. 198.
  - *b'*. Median segment not so densely punctured; posterior margin of hind wing fuscous .... *L. simillima*, p. 199.

B. Abdomen entirely black.
- *a*. Median segment coarsely reticulate.
  - *a'*. Of small size (L. 7 mm.) .... *L. tisiphone*, p. 198.
  - *b'*. Of much larger size (L. 22 mm.) .... *L. carbonaria*, p. 198.
- *b*. Median segment punctured or striate.
  - *a'*. Legs more or less red.
    - *a*². Posterior femora only red.
      - *a*³. Median segment closely and finely punctured, the punctures running into striæ above; hind wing much lighter in colour than fore wing .... *L. erratica*, p. 199.
      - *b*³. Median segment not so finely punctured, narrowly reticulate along base .... *L. maura*, p. 199.
    - *b*². All the femora, tibiæ, and tarsi of legs red .... *L. rufipes*, p. 200.

b'. Legs black.

*a*². Form very slender; abdomen much longer than head and thorax united; median segment coarsely transversely striate: length 18 mm. .... *L. elegans*, p. 197.

*b*². Form not particularly slender, abdomen not remarkably long; median segment finely transversely striate: length 10 mm.

*a*³. Anterior ocellus normal, round .. *L. nana*, p. 200.

*b*³. Anterior ocellus elongate, pointed in front and back.............. *L. nigriventris*, p. 201.

379. **Larra elegans**, n. sp.

♀. Closely resembles *Notogonia laboriosa*, Smith (p. 204), in coloration, but the pile on the face and thorax is more dense, and the bands on the abdomen brighter and more silvery, wings without the fuscous apical margins. In form and sculpture it is of course very different. Long and slender; the abdomen elongate, about one-quarter of its own length, longer than the head and thorax united; the pronotum not depressed; the median segment coarsely transversely striate, a medial longitudinal carina from base to verge of the truncated portion of the segment; pygidial area bare, without pubescence, punctured.

Fig. 45.
Larra elegans, ♀. $\frac{3}{2}$.

Hab. Tenasserim. ♀. *Length* 18; *exp.* 22 mm. ♂ unknown.

380. **Larra fuscipennis**, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 126.

♂. Head and thorax in front finely and rather closely punctured, the punctures much finer on the scutellum and post-scutellum; clypeus and front to above the base of the antennæ densely pubescent; the front above transversely margined, the sides above the margin next the inner orbits raised, a deep transverse sulcation behind the ocellar region; median segment longer than the mesonotum, posteriorly truncate, finely punctured, and thinly pubescent; abdomen smooth, the posterior margins of the basal six segments with transverse thin pilose bands; the pygidial area thinly pubescent. Black, the basal two abdominal segments red, with the centre above black, the margins of the basal six segments testaceous; the pubescence white, the transverse bands on the abdomen silvery; wings light fuscous, the basal cell of the fore, and the base of the hind wing clear hyaline.

Hab. Tirhoot, Bengal. ♂. *Length* 13; *exp.* 25 mm. Type in coll. Rothney.

381. Larra tisiphone.

Larrada tisiphone, *Smith, Jour. Linn. Soc.* 1858, p. 103, ♀.
Larra tisiphone, *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 248; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 125.
Notogonia tisiphone, *Bingh. P. Z. S.* 1896, p. 442.

♀. Head and thorax in front very minutely and closely punctured, opaque, the scutellum and postscutellum more widely punctured, head in front and clypeus densely pruinose; median segment somewhat coarsely reticulate, steeply sloped posteriorly, almost truncate, with a medial narrow furrow down the middle of the steeply sloped portion; abdomen smooth and shining, the basal four segments with transverse pruinose bands on their posterior margins. Jet-black; the clypeus, face in front, the cheeks, sides of the median segment, the legs, and the transverse abdominal bands covered with silvery pile; wings light fusco-hyaline and iridescent.

Hab. Ceylon; Tenasserim; Borneo. ♀. *Length* 7; *exp.* 14 mm. ♂ unknown.

382. Larra sumatrana, *Kohl, Verh. zool.-bot. Ges. Wien*, 1883, p. 354; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 126.

♀. Head on the vertex above, pro- and mesonotum, scutellum and postscutellum very finely and closely punctured, the front above the antennæ with three deep sulcations, very smooth and shining; median segment more densely and closely punctured than the rest of the thorax, the punctures running almost into transverse striæ; posteriorly the median segment is truncate, with the edge of the truncation above somewhat rounded, the sides of the segment are slightly compressed towards the base; abdomen smooth, polished, pygidial area triangular, sparsely punctured. Black, the basal four segments of the abdomen dark red, the 5th and 6th black, sometimes slightly reddish; wings dark dull fuscous, the hind wing clear hyaline along its posterior margin.

Hab. Sumatra (*Kohl*); Tenasserim. ♀. *Length* 18–20; *exp.* 32–36 mm. ♂ unknown.

383. Larra carbonaria.

Larrada carbonaria, *Smith, Jour. Linn. Soc.* 1858, p. 102, ♀.
Larra carbonaria, *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 242; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 125.

♀. Head smooth and sparsely, thorax closely and very finely and evenly punctured; abdomen impunctate, highly polished and shining; median segment about as long as the rest of the thorax, narrowed slightly and abruptly truncate posteriorly, the edge of the truncation above rounded, the dorsal surface of the segment somewhat coarsely reticulate, the face of the truncated apex coarsely transversely striate, a much abbreviated but marked

medial longitudinal carina at the base, and the truncated portion with a deep vertical furrow. Intense black; wings dark fuscous brown, suffused with a rich purple effulgence.

Hab. Tenasserim; Singapore. ♀. *Length* 22; *exp.* 36 mm. Rare in Tenasserim.

384. **Larra erratica,** n. sp.

♀. Head and thorax finely and very closely punctured: the clypeus transverse, much broader than long, its anterior margin boldly arched; median segment long, as long as the head and rest of thorax united, truncate posteriorly; above and on the sides closely punctured, the punctures above running into transverse striæ, the face of the truncation divided by a vertical furrow; abdomen smooth, shining, and impunctate. Intense black, the posterior femora blood-red; wings fuscous, the hind wing clearer, especially at base, the fore wing with a brilliant coppery effulgence.

♂ similar, but smaller; the face in front with dense silvery pile, the median segment with coarser punctures and a short longitudinal medial carina at base above.

Hab. Ceylon; Tenasserim. ♀. *Length* 15–19; *exp.* 24–32 mm. ♂. *Length* 17; *exp.* 28 mm.

Resembles *L. glabrata*, Smith, from Celebes, which, however, is more coarsely punctured and has *all* the femora red.

385. **Larra simillima.**

Larrada simillima, *Smith, Cat.* iv, p. 275, ♀.
Larra simillima, *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 247; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 125.

♀. Head and thorax closely and strongly punctured, thinly pubescent; clypeus much broader than long, its anterior margin arched, very slightly emarginate on either side of the middle; median segment long, very little more coarsely punctured than the mesonotum, concavo-truncate posteriorly, slightly constricted at base, and gradually but perceptibly widening to the truncated apex; abdomen longer than the head and thorax together, obscurely pruinose; pygidial area bare, with fine lateral grooves and a few scattered punctures. Black, the basal four segments of the abdomen red; wings dark fuscous with a slight purplish effulgence.

Hab. India; Africa (*Smith*); Tirhoot, Bengal (*Rothney coll.*). ♀. *Length* 20; *exp.* 28 mm.

386. **Larra maura.**

Sphex maura, *Fabr. Ent. Syst.* ii, p. 212.
Pompilus maurus, *Fabr. Ent. Syst. Suppl.* p. 247.
Liris maura, *Fabr. Syst. Piez.* p. 230.
Larrada maura, *Smith, Cat.* iv, p. 277.
Larra maura, *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 245; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 125.

♀. Head and thorax minutely and closely punctured and thinly pubescent, head shining; clypeus much broader than long, its anterior margin widely arched; median segment truncate, posteriorly closely but rather more coarsely punctured, at base narrowly reticulate, and bearing a medial longitudinal shallow furrow with, in the middle, a carina along its length up to the verge of the truncate posterior portion; abdomen smooth and shining, with transverse bands of silky pile, which are broadened laterally on the posterior margins of the 1st–5th segments above, these bands being only visible in certain lights. Black, the pubescence and pile silvery white, the mandibles and the scape of the antennæ in front rufo-fuscous, the posterior femora bright red; wings very light fusco-hyaline.

Hab. Tranquebar (*Fabr.*); Northern India. ♀. *Length* 15; *exp.* 24 mm.

It is with some doubt that I identify one specimen contained in the collection at South Kensington with this species. Of the 4 specimens labelled *Larrada maura* in the Museum, three are without doubt *Notogonia subtessellata*, Smith, having the pronotum depressed below the level of the mesonotum, the pygidial area pubescent, and the claws of the tarsi rather long; the 4th is a true *Larra*, with the pronotum not or scarcely depressed, the pygidial area bare and punctured, and claws of the tarsi short. It resembles *Larra glabrata*, Smith, but is quite distinct from it, and possibly is the species described by Fabricius.

387. **Larra nana**, n. sp.

♀. Head, pro- and mesonotum, scutellum and postscutellum smooth, opaque, the surface only finely aciculate; median segment finely transversely striate; head broader than the thorax, the eyes convergent towards the vertex; the front sulcate; the clypeus densely pilose; the median segment as long as the pro- and mesonotum united, the sides densely pilose; abdomen pruinose, with indistinct transverse bands visible only in certain lights on the posterior margins of the 1st–5th segments; pygidial area large, bare, sparsely punctured, and with a shallow furrow along the lateral margins not reaching the apex of the segment. Jet-black, with silvery pile; wings hyaline with a yellowish tinge, nervures and tegulæ testaceous.

Hab. Tenasserim. ♀. *Length* 10; *exp.* 16 mm. ♂ unknown. Type in the British Museum.

388. **Larra rufipes.**

Larrada rufipes, *Smith, Jour. Linn. Soc.* 1859, p. 17, ♀.
Larra rufipes, *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 247.

♀. Head, thorax, and abdomen pruinose, and very minutely and closely punctured; clypeus much broader than long, trans-

verse, anterior and basal margins parallel and boldly arched; median segment above finely transversely striate, on the sides smooth; abdomen long, slender, with the pygidial area bare and punctured, the basal ventral segment longitudinally carinated and with some coarse striæ on the margin; tarsal claws long and slender. Black, the head and clypeus in front, the posterior margin of the pronotum, and broad transverse bands on the apical margins of the 1st–5th segments of the abdomen bright silvery; the legs, except the coxæ and trochanters, red.

Var. With anterior legs above and the base of the femora of all the legs dusky black.

♂ similar, but smaller.

Hab. Celebes; Tenasserim. ♀. *Length* 13; *exp.* 18 mm. ♂. *Length* 10; *exp.* 15 mm.

389. **Larra nigriventris**, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 127.

♀. Head, thorax, and abdomen pilose; clypeus short, broad, slightly projecting in the middle at apex and carinated; vertex depressed, a wide furrow along the inner orbits, a medial shallow furrow on the front, bifurcating at the anterior ocellus; posterior ocelli obsolete, anterior ocellus pointed anteriorly; median segment above opaque, sides and apex striate; abdomen long, slender; pygidial area bare, with very fine punctures. Black, the clypeus with dense silvery pubescence; the rest of the head, the thorax, and abdomen with silky short silvery pile, seen only in certain lights; the pile on the abdomen denser on the apical margins of the 1st–5th segments, forming transverse glittering bands: wings light flavo-hyaline, broadly fuscous along the apical margins; nervures and tegulæ testaceous.

♂ similar, but with the median segment more coarsely striate.

Hab. Barrackpore; Tirhoot; North-West Provinces; Poona; Bombay; Pegu Hills, Burma; Tenasserim. ♀. *Length* 10–12; *exp.* 18–20 mm. ♂. *Length* 9–10; *exp.* 17–20 mm.

Genus NOTOGONIA.

Tachytes, pt., *Dahlb. Hym. Eur.* i, p. 468 (1845).
Larrada, pt., *Smith, Cat.* iv, p. 274 (1856).
Notogonia, *Costa, Ann. Mus. Zool. Univ. Napoli,* iv, pp. 80, 82 (1867).

Type, *N. nigra*, Van d. Lind.

Range. Both hemispheres.

Head wider than the thorax; mandibles incised on the outer margin near the middle, and with one blunt tooth on the inner margin nearer the base; eyes convergent at vertex, especially so in the male; the pronotum small and depressed below and under the level of the mesonotum; fore wing as in *Larra*, with one radial

and three cubital cells, the radial cell truncate at apex and appendiculate, the cubital cells similar in size and form to those in the fore wing of *Larra*; legs longer than in that genus, with the claws of the tarsi more slender and much longer; the intermediate tibiæ with one apical spur; abdomen long, the 2nd ventral segment with a marked convexity near its base; the pygidial area, especially in the female, covered with a dense short pubescence.

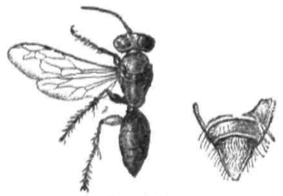

Fig. 46.
Notogonia subtessellata, ♀. $\frac{3}{2}$.

Notogonia, like *Larra* and the majority of the other allied genera, is predatory on various species of crickets. I have often seen *N. subtessellata*, Smith, dragging, with immense labour and pains, a half-paralyzed cricket twice or three times as big as itself to its nest-hole.

Key to the Species.

A. Legs more or less red.	
a. Posterior femora only red; pile on the head, thorax, and abdomen silvery. L. 11–13 mm.	*N. subtessellata*, p. 202.
b. Posterior femora black; pile on the head, thorax, and abdomen golden. L. 17–20 mm.	*N. deplanata*, p. 203.
B. Legs entirely black.	
a. Pile on head, thorax, and legs golden	*N. deplanata* (var.), [p. 203.
b. Pile on head, thorax, and abdomen silvery.	
a'. Wings light fusco-hyaline, with no tinge of yellow; sides of median segment obliquely striate	*N. laboriosa*, p. 204.
b'. Wings hyaline, with a decided tinge of yellow.	
a^2. Sides of median segment transversely striate. L. 12–14 mm..........	*N. jaculatrix*, p. 203.
b^2. Sides of median segment coarsely reticulate. L. 8-11 mm.	*N. tristis*, p. 204.

390. **Notogonia subtessellata.**

Larrada subtessellata, *Smith, Cat.* iv, p. 277, ♀.
Notogonia subtessellata, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 130.
Larrada exilipes, *Smith, Cat.* iv, p. 278, ♂.

♀. Head and thorax very minutely and closely punctured, pruinose; scutellum bare, shining; median segment finely rugose above, with a medial longitudinal carina not reaching the apex, the sides and the face of the posterior truncation at the lateral margins transversely striate and densely pruinose; abdomen dull,

opaque, the margins of segments 1–5 above with broad transverse bands of thin sericeous pile; the pygidial area on the apical segment covered with short dense pubescence. Dull black, the pile on the clypeus, front, sides, and apex of the median segment, and on the abdomen silvery; on the lateral margins of the pro- and mesonotum it has a golden tinge; the short pubescence on the pygidial area yellowish; posterior femora blood-red; wings in the type specimen subhyaline, ordinarily, however, hyaline and iridescent.

♂ similar, but slighter and smaller, with the median segment more coarsely rugose and transversely striate on the sides.

Hab. Northern India; Barrackpore; Poona; Burma; Tenasserim; Ceylon. ♀. *Length* 11–13; *exp.* 20–24 mm. ♂. *Length* 8; *exp.* 16 mm.

391. **Notogonia deplanata,** *Kohl, Verh. zool.-bot. Ges. Wien,* 1883, p. 358, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 130.
Liris hæmorrhoidalis, *Bingh.* (*nec Fabr.*) *P. Z. S.* 1896, p. 443.

♀. Head, thorax, and abdomen more or less densely pruinose; the head, pro- and mesonotum underneath the pile very minutely and closely punctured; median segment long, as long as the head and thorax united, finely transversely rugose; the striæ slightly oblique at the base, from which a short medial longitudinal carina extends halfway down the length of the median segment; abdomen smooth underneath the pile, with exceedingly minute close punctures. Black; the head, thorax, median segment on the sides, the legs, and the abdomen covered with dense golden pile; the tibiæ and tarsi ferruginous red; wings flavo-hyaline, the apical margins broadly fuscous.

Var. The tibiæ and tarsi concolorous with the rest of the body, the wings not infuscated at apex.

♂ similar but smaller.

Hab. Sikhim; Tenasserim; Ceylon. ♀. *Length* 17–20; *exp.* 32–36 mm. ♂. *Length* 17; *exp.* 32 mm.

392. **Notogonia jaculatrix.**
Larrada jaculator, *Smith, Cat.* iv, p. 279, ♀.
Notogonia jaculator, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 129.

♀. Head, thorax, and abdomen pruinose; the clypeus, face in front, and the cheeks behind the eyes densely so; the head, pro- and mesonotum very minutely and closely punctured; median segment subcylindrical above, posteriorly truncate, transversely and finely striate and pruinose on the sides; abdomen dull and opaque, segments 1–4 pruinose, with the base of the 1st segment broadly, and large posteriorly rounded lateral spots on the segments 2–4 smooth not pruinose, the 5th segment with a narrow

medial longitudinal streak, and the apical margin narrowly pruinose; apical segment with the pygidial area set with short stiff hairs. Black with silvery pile; the pygidial area with silvery pubescence, which in certain lights has a golden tint; wings flavo-hyaline, darker towards the base and along the costal margin of the fore wing; the apical margins faintly fuscescent.

Hab. Barrackpore; Mussooree; Poona; Pegu Hills, Burma; Tenasserim. ♀ ♂. *Length* 12–14; *exp.* 22–26 mm.

393. Notogonia laboriosa.

Larrada laborisa, *Smith, Cat.* iv, p. 278, ♀.

♀. Head and thorax very closely and minutely punctured; the clypeus and face in front lightly pruinose; scutellum impunctate, polished, and shining; median segment slightly narrowed posteriorly, truncate at apex, above transversely and on the sides delicately obliquely striate; from the base a slight longitudinal carina extends down the middle above, not reaching the edge of the truncation, this last with a conspicuous central vertical furrow; abdomen smooth and shining, the apical margins of segments 1–4 with broad slightly pruinose bands, these bands boldly arched anteriorly, almost subtriangular. Black, with cinereous pile, which on the face and clypeus has in certain lights a silvery tint; pygidial area covered with stiff black pubescence; wings light fusco-hyaline, darkening at the apical margin.

Hab. The Philippine Islands; Tenasserim. ♀. *Length* 12–13; *exp.* 24–26 mm. ♂ slightly smaller.

394. Notogonia tristis.

Larrada tristis, *Smith, Cat.* iv, p. 277, ♀.
Larra tristis, *Kohl, Verh. zool.-bot. Ges. Wien,* 1884, p. 248.

♀. Head and thorax in front very minutely and closely punctured, opaque; median segment as long as the rest of the thorax, slightly narrowed posteriorly, the apex abruptly truncate, above and on the sides reticulate, the apex coarsely rugose and slightly pubescent; a medial, longitudinal, very fine and obscure carina from base, not quite reaching the verge of the truncation, the face of the latter with a fine medial vertical furrow; abdomen pruinose, dull and opaque, the surface finely aciculate; legs with a short, rather thick pile on the coxæ, femora, and tibiæ. Jet-black, the pubescence silvery, the clypeus and front of the face, and along the posterior margins of abdominal segments 1–4 covered with silvery pile; wings flavo-hyaline, nervures and tegulæ testaceous.

Hab. Tenasserim, extending into the Malay region and Borneo. ♀. *Length* 8–11; *exp.* 17–20 mm.

Genus LIRIS.

Liris, *Fabr. Syst. Piez.* p. 227 (1804).
Tachytes, *Lepel. Hym.* iii, p. 239 (1845).

Type, *L. aurata*, Fabr.
Range. Both hemispheres.

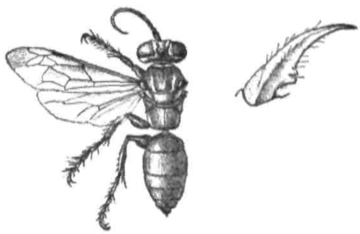

Fig. 47.—*Liris ducalis*, ♀. ½.

Head a little wider than the thorax; mandibles with no excision on their outer margins, the inner margin bidentate close to the base; face more or less richly pubescent; the convergence of the eyes as in the genus *Notogonia*; the front puckered along the inner orbits and broadly furrowed; ocelli—the anterior ocellus round, of ordinary form, complete, the hinder two lengthened, flat, hardly observable, and lying considerably to the rear of the anterior one; the pronotum depressed beneath the level of the mesonotum, its posterior margin not transverse, but coming to a point in the middle; wings—fore wing with one radial and three cubital cells, of the same form and shape as those in the genus *Larra*; legs, on the whole, a little longer than in *Larra*, and nearly as long as in *Notogonia*; the armature of the legs in general well-developed; intermediate tibiæ with one apical spur; claws lengthened; the median segment and the 2nd ventral segment similar to those of *Larra*; the anal segment with a pygidial area covered with short stiff pubescence.

These insects, like most of the allies of *Larra*, make their nest-holes in the ground, providing as food for their future brood Orthopterous insects of various kinds. *L. aurata* may, like *Notogonia subtessellata*, commonly be seen struggling with a paralyzed cricket three or four times its own weight and size.

Key to the Species.

a. Wings dark fuscous, suffused more or less with a purple effulgence.
  a'. Robustly, stoutly made, of comparatively large size. L. 24–30 mm. . . . . *L. ducalis*, p. 207.

b′. More slenderly made, of comparatively small size. L. 16–18 mm. .... *L. nigripennis*, p. 206.
b. Wings flavo-hyaline, apex fuscous ...... *L. hæmorrhoidalis*, p. 207.
c. Wings fusco-hyaline, fore wing much darker than hind wing .... *L. aurata*, p. 206.

395. **Liris aurata.**

Sphex aurata, *Fabr. Ent. Syst.* ii, p. 213.
Pompilus auratus, *Fabr. Ent. Syst. Suppl.* p. 250.
Liris aurata, *Fabr. Syst. Piez.* p. 228; *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 241; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 131.
Tachytes opulenta, *Lepel. Hym.* iii, p. 246, ♀ ♂.
Larrada aurulenta, *Smith, Cat.* iv, p. 276, pl. vii, fig. 5.

♀. Head and thorax densely pruinose above; abdomen dull and opaque, with wide transverse pruinose bands on the posterior margins of segments 1–5 above; head, pro- and mesonotum very minutely and closely punctured; median segment long, as long as the rest of the thorax and the head united, transversely striate, and with a fine medial longitudinal carina not reaching the verge of the truncated posterior portion; the face of the truncation itself with a short medial vertical carina, broad at top. Black, the scape and basal joint of the flagellum of the antennæ, and the apical half or two-thirds of the femora, tibiæ, and tarsi of the legs a pale orange-red; the silky pile on the face, pro- and mesonotum dense and golden ferruginous; on the sides of the scutellum, postscutellum, and median segment yellowish; the transverse bands on the abdomen thin and of a cinereous silvery colour; wings fusco-hyaline, suffused with a purplish tint, the posterior wings lighter.

Hab. Africa, the Cape, and Gambia; throughout India, Burma, Tenasserim, and Ceylon; Borneo; Java; Sumatra; Celebes; China; Japan. ♀. *Length* 17–21; *exp.* 30–36 mm. ♂. *Length* 15–19; *exp.* 28–31 mm.

396. **Liris nigripennis,** *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 131, ♀ ♂.

♀. Head and thorax dull, opaque, very minutely punctured, and densely pruinose, less so on the vertex and disc of the mesonotum; median segment as long as the rest of the thorax, subcylindrical above, narrowing and abruptly truncate posteriorly, very finely transversely striate, and delicately pruinose, the truncated apex with a deep vertical furrow; abdomen long, the posterior margins of segments 1–4 broadly transversely pruinose. Black, the head and thorax with golden pile, the delicate pile on the median segment and the bands on the posterior margins of the abdominal segments white; wings dark fuscous with a purple effulgence, conspicuously paler across the cubital cells.

Hab. Sikhim; Bangalore; Poona; Tenasserim. ♀. *Length* 16–18; *exp.* 29–34 mm. ♂. *Length* 12–15; *exp.* 24–28 mm.

397. **Liris ducalis.**

Larrada ducalis, *Smith, Jour. Linn. Soc.* 1861, p. 84, ♀.
Larra (Liris) ducalis, *Kohl, Verh. zool.-bot. Ges. Wien,* 1884, p. 243.

♀. Head dull and opaque on the vertex; on the clypeus, front, sides of the face, cheeks, and occiput densely pruinose; thorax, pro- and mesonotum, scutellum and postscutellum smooth and shining; the posterior margin of the pronotum, the lateral and apical margins of the mesonotum, and the sides of the scutellum and postscutellum densely pruinose; median segment long, narrowed posteriorly, the apex abruptly truncate; above obliquely striate, with a medial longitudinal carina from the base of the segment continued over the face of the truncation to the apex; legs short, stout, spinose, the anterior femora beneath pruinose; abdomen smooth, not very shining, basal segment at base vertical, nearly truncate; pygidial area set with stiff short hairs. Jet-black, with brilliant shining golden pile; the pygidium with black or fulvous red hairs; wings dark brown, with a rich purple effulgence.

Hab. Sikhim; Burma; Tenasserim; Ceylon; Celebes. ♀. *Length* 24–30; *exp.* 42–48 mm.

398. **Liris hæmorrhoidalis.** (Pl. II, fig. 2.)

Pompilus hæmorrhoidalis, *Fabr. Syst. Piez.* p. 198.
Liris savignyi, *Spin. Ann. Soc. Ent. Fr.* 1838, p. 476.
Lyrops hæmorrhoidalis, *Guér. Cuv. Icon. Règn. Anim., Ins.* p. 439, ♀.
Lyrops aureiventris, *Guér. t. c.* p. 440, pl. lxx, fig. 9, ♂.
Liris orichalcea, *Dahlb. Hym. Eur.* i, p. 135, ♂.
Liris savignyi, *Dahlb. t. c.* i, p. 471, ♂ ♀.
Tachytes illudens, *Lepel. Hym.* iii, p. 249, ♀.
Larrada hæmorrhoidalis, *Smith, Cat.* iv, p. 280.
Liris hæmorrhoidalis, *Kohl, Verh. zool.-bot. Ges. Wien,* 1884, pp. 244, 256.

♀. Head, thorax, and abdomen covered with a dense, short, silky pile above and on the sides; beneath and the legs bare; median segment long, longer than the rest of the thorax, rugose above underneath the pubescence, obscurely transversely striate; on the sides it is finely and obliquely striate. Black, the base of the mandible, the scape and basal two or three joints of the flagellum of the antennæ, the tegulæ, the legs except the coxæ, trochanters, and sometimes the base of the femora, and the apical margins of the 4th and 5th abdominal segments above pale rufous; the dense golden silky pile has a tesselated appearance on the abdomen, and is paler and longer on the median segment; wings flavo-hyaline, the apical margins fuscescent.

♂ similar, slightly smaller; the 2nd joint of the posterior tarsi a little dilated.

Hab. Spain; Sicily; Egypt; Senegal; Syria; Aden; Western India; Punjab. ♀. *Length* 17–24; *exp.* 32–42 mm. ♂. *Length* 15–20; *exp.* 27–35 mm.

Genus PARALIRIS.

Paraliris, *Kohl, Verh. zool.-bot. Ges. Wien*, 1883, p. 361; *id.* 1884, p. 259.

Type, *P. kriechbaumeri*, Kohl.
Range. Africa; Burma and Tenasserim.

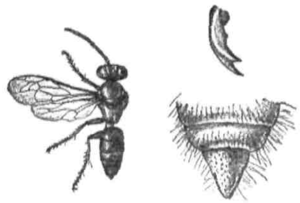

Fig. 48.—*Paraliris faceta*, ♀. 1/1.

Characters nearly those of *Liris*, Fabr., but the whole body covered with soft thin pubescence, never with close pile; pygidial area bare and punctured, as in *Larra*; 2nd ventral segment without the marked convexity occurring in *Liris*.

I know of only one species found within our limits.

399. **Paraliris faceta**, n. sp.

♀ ♂. Head, pro- and mesonotum, scutellum, postscutellum, and abdomen sparingly punctured; the punctures on the abdomen beneath coarser and more scattered; clypeus with the anterior margin produced in the middle, transverse at apex, the sides conspicuously emarginate; front and base of clypeus with long and thin pubescence; median segment above slightly flat, finely transversely striate, the striæ waved, posteriorly rounded, with a steep slope to the apex, the sides sparsely but regularly punctured and thinly pubescent; from the base a fine longitudinal carina runs down the middle of the segment, not quite reaching the edge of the rounded posterior slope; abdomen shining, the apical margins of segments 1–5 very slightly but perceptibly constricted. Black, the pubescence hoary white; wings fusco-hyaline, suffused with a purplish tint.

Hab. Burma; Tenasserim. ♀. *Length* 18–19; *exp.* 28–32 mm. ♂. *Length* 15–17; *exp.* 27–29 mm.

Genus LYRODA.

Lyroda, *Say, Jour. Nat. Hist. Bost.* i, p. 372 (1837).
Morphota, *Smith, Cat.* iv, p. 293 (1856).

Type, *L. subita*, Say.
Range. The Nearctic, Neotropic, and Oriental regions.

Head wider than the thorax; mandibles incised on their outer side; eyes not convergent, the inner orbits nearly parallel; ocelli complete and fully formed, placed in a wide triangle on the vertex; pronotum long, not much depressed beneath the level of the mesonotum; median segment short, about as long as the mesonotum, above rounded posteriorly, with a steep slope to the apex; abdomen subpetiolate in the Oriental species, longish, acuminate at

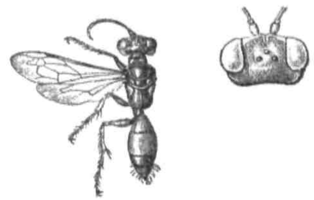

Fig. 49.—*Lyroda formosa*, ♀. ‡.

apex; pygidial area in the female covered with short hairs; wing with the radial cell truncate at apex and appendiculate; three cubital cells, the 1st equal in length, measured on the cubital nervure, to the 2nd and 3rd united, 2nd subtriangular or trapezoidal, 3rd oblique, wider below than above.

Nothing is on record of the habits. Only two species are known from India, but no doubt others exist.

Key to the Species.

a. Basal two segments of abdomen red .... *L. formosa*, p. 209.
b. Abdomen entirely black .... *L. venusta*, p. 210.

400. **Lyroda formosa.**

Morphota formosa, *Smith, Jour. Linn. Soc.* 1859, p. 17, ♀.
Lyroda formosa, *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 267.
? Astata argenteofacialis, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 151 (var.).

♀. Head and thorax opaque velvety, densely pruinose on the front of the head, clypeus, cheeks, pronotum, apex and sides of the mesonotum, and apex and sides of the median segment; front with an impressed line from the anterior ocellus reaching up to the base of the antennæ; mesonotum with a wide medial depression anteriorly; median segment finely rugose, with a medial longitudinal fine carina from base not reaching the apex of the segment; abdomen slightly curved, subpetiolate, the margins of segments 1–4 above with broad transverse pruinose bands. Black, the basal two abdominal segments red; the clypeus, front, cheeks, pronotum, apex and sides of the mesonotum, and apex and sides of the median segment with dense silvery pile, having

a golden-yellow tint; bands on the abdomen pure silvery; wings hyaline and iridescent.

Hab. Celebes; Tenasserim; Barrackpore; Sikhim. ♀. *Length* 9–11; *exp.* 15–18 mm.

401. **Lyroda venusta**, n. sp.

♀. Closely resembles *L. formosa*, Smith, and like that species is black, with dense silvery pile on the front, the clypeus, cheeks, pronotum, sides and apex of the mesonotum, sides and apex of the median segment, and the posterior margins of the 1st–4th abdominal segments above; but the median segment is somewhat coarsely reticulate, not finely rugose, and the abdomen has not the two basal segments red, but is entirely black. This species is also slighter and smaller than *L. formosa*.

Hab. Tenasserim. ♀. *Length* 7–8; *exp.* 12–15 mm. ♂. *Length* 6–7; *exp.* 12 mm.

Genus PIAGETIA.

Piagetia, *Rits. Ent. Month. Mag.* ix, p. 121 (1872).

Type, *P. ritsemæ*, Rits.

Range. Ethiopian and Oriental regions.

Head a little broader than the thorax; mandibles incised on their outer margin; eyes moderately convergent towards the vertex; anterior ocellus complete, round, normal; posterior ocelli flat and indistinctly formed as in *Tachytes*, *Tachysphex*, &c.; pronotum depressed below the level of the mesonotum, lengthened into a collar anteriorly; middle segment about as long as the mesonotum, or a little shorter, narrowed posteriorly and roundly truncate; fore wing with one radial and three cubital cells, the radial cell broad and broadly truncate at apex, appendiculate; 1st cubital cell as long as the 2nd and 3rd united; the 2nd trapeziform, receiving both recurrent nervures; legs with tibiæ and tarsi spinose, the front tarsi ciliated, the cilia short and feeble; intermediate tibiæ with one apical spur; posterior femora in the male with a strong curved spine or hook on the underside, in the female merely thickened, sometimes with an indication of a curved spine; abdomen with the basal segment clavate, slightly curved; the anal segment with a well-marked pygidial area, in the female triangular and nearly flat.

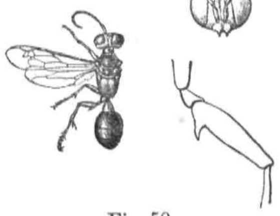

Fig. 50.
Piagetia fasciatipennis, ♂. $\frac{3}{2}$.

Nothing is on record as to the habits of the species of this genus, of which, so far as I know, only five have been

described. There is in the collection of the British Museum a sixth undescribed form from Natal, received in the Museum in 1855, from Dr. Gueinzius; and as one specimen, a female, is pinned above a cricket, as if in the act of carrying it, I presume it was so engaged at the time of capture. It is highly probable that all the species of this genus are, like the rest of the closely allied Larrid genera, predatory on Orthoptera.

Key to the Species.

a. Clypeus (♀) with a medial carina, transverse or incised at apex; antennæ entirely red	*P. ruficornis*, p. 211.
b. Clypeus (♀) anteriorly with two teeth; scape of antennæ only red	*P. fasciatipennis*, p. 211.

402. **Piagetia ruficornis**, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 133, ♀.

♀. Head, thorax, and abdomen opaque, the head and thorax very minutely and closely punctured, the surface of the abdomen above aciculate; clypeus broad, transverse anteriorly, the sides oblique, the disc having a medial short vertical carina; the front with a medial vertical furrow, and a broader curved shallow furrow on each side; median segment with an indistinct carina down the middle, the apex of the segment strongly narrowed and truncate; an oval, rather deep fovea on the posterior face of the truncation; abdomen about the length of the thorax; the pygidial area bare, distantly punctured. Black; the base of the mandibles, the clypeus, antennæ, pronotum, sides of the mesonotum anteriorly, sides and apex of the median segment broadly, the legs, and petiole of the abdomen dull reddish; the apical two joints of the antennæ, the coxæ of all the legs, and the femora and tibiæ of the intermediate and posterior pair more or less marked with fuscous black; the clypeus and front and base of the median segment with dense silvery pile; wings hyaline and iridescent, with a fuscous subapical fascia from the base of the radial to the apex of the 2nd discoidal cell; nervures and tegulæ testaceous.

Hab. Calcutta; Poona. ♀. *Length* 9–10; *exp.* 16–18 mm. ♂ unknown.

403. **Piagetia fasciatipennis**, *Cam. Mem. Manch. L. Ph. Soc.* (4), ii, 1889, p. 16, ♂.

♀. Closely allied to and resembling *P. ruficornis*, Cam.; differs in the clypeus having two strong teeth anteriorly, in the median segment being broader at the apex, and the femoral tooth, which in *ruficornis* forms a mere tubercle at the base below of the posterior femora, being developed into a small but distinctly

curved tooth. In colour *P. fasciatipennis* differs in having the red confined on the head and thorax to the base of the mandibles, the clypeus, scape of the antennæ, pronotum, the anterior lateral angles narrowly of the mesonotum, and the extreme apex of the median segment; on the abdomen the red extends on to the base of the 2nd segment, and the whole anal segment is red.

♂ similar but smaller, with the femoral tooth very large, curved, and strong. Wings in both sexes similar to those of *P. ruficornis*.

Hab. Calcutta; Rangoon, Burma; Tenasserim; Ceylon. ♀. *Length* 8–10; *exp.* 16–20 mm. ♂. *Length* 7–9; *exp.* 16–18 mm.

Genus **LIANTHRENA**, gen. nov.

Type, *L. kohlii*, Bingh.

Range. Punjab, India.

Allied to *Palarus*, Latr. Head transverse, a little wider than the thorax, emarginate posteriorly; eyes large, ovate, reaching the base of the mandibles below, their inner orbits convergent towards the vertex, but not oblique, widely arched outwards in the middle; mandibles incised on their outer margin, the apex simple, the inner margin with two blunt teeth about the middle; clypeus large, its anterior margin arched; antennæ with the flagellum slightly but distinctly incrassate; front above the base of the antennæ convexly raised, gibbous; ocelli complete, round and subequal, the anterior ocellus being only very slightly larger than either of the posterior ones; the three placed in a broad triangle just above the frontal convex area; pronotum depressed below the level of the mesonotum; scutellum and post-scutellum large, slightly convex; median segment about the length of the mesonotum, subcylindrical, and abruptly truncate posteriorly; the episternal suture of the mesopleuræ distinct. Legs short, the anterior femora not emarginate at base below; the anterior tarsi ciliated; the intermediate coxæ moderately separate, the intermediate tibiæ with one apical spine, the posterior four tibiæ and tarsi spinose; claws simple. Wings, especially the hind wing, broad and ample; the fore wing with one radial and three cubital cells, the radial cell acutely, diagonally truncate at apex, appendiculate, the cubital cells subequal measured on the cubital nervure, at top the 1st and 2nd united a little longer than the 3rd, the second cubital cell receives both recurrent nervures; the humuli on the hind wing

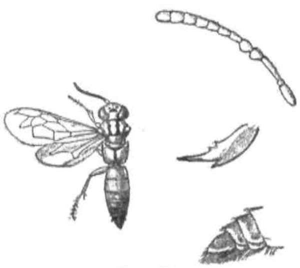

Fig. 51.
Lianthrena kohlii, ♀. ♀.

ranged in one unbroken row. Abdomen about as long as the head and thorax united, the 1st segment concavo-truncate at base, the 2nd ventral segment not convexly raised, normal; pygidial area (♀ and ♂) bare, punctured, laterally ciliated with fine long hairs.

404. **Lianthrena kohlii**, n. sp.

♀ ♂. Head, thorax, and abdomen smooth and shining; the vertex of the head, the mesonotum anteriorly, and the pygidial area on the apical abdominal segment more or less punctured, the convex raised space on the front above the base of the antennæ marked with a brief medial longitudinal furrow; antennæ—the flagellum in the male with the apices of the 3rd and 4th joints dilated beneath; median segment above very indistinctly but finely reticulate rugose; the sides smooth, a fine medial longitudinally-impressed line from the base of the segment continued over the margin of the truncate portion but not reaching the apex. Pale yellow, the apex of the mandibles ferruginous; the apical ten joints of the flagellum of the antennæ, a spot on the front above their base, two transverse spots above that, the region of the ocelli, a line behind the eyes, three parallel broad lines on the mesonotum, a T-shaped mark on the median segment above, a spot near the apex of the same, the sternum, the base of the coxæ, and the apical two, sometimes three or four, segments of the abdomen, black, the last sometimes also shaded with rusty red or fulvous; a little fine silvery pile on the clypeus and sides and apex of the median segment; wings hyaline, nervures pale testaceous, tegulæ ferruginous.

Hab. The Punjab. ♀ ♂. *Length* 8–9; *exp.* 17–18 mm.

Genus PALARUS.

Crabro, pt., *Fabr. Spec. Ins.* i, p. 470 (1781).
Philanthus, pt., *Fabr. Syst. Piez.* p. 304 (1804).
Palarus, *Latr. Hist. Nat. Ins.* iii, p. 336 (1802).
Gonius, *Jurine, Hym.* p. 205 (1807).

Type, *P. flavipes*, Fabr.
Range. Palæarctic, Ethiopian, and Oriental regions.

Fig. 52.—*Palarus*: fore wing.

Head about as broad as the thorax; eyes large, their inner orbits as a rule strongly convergent towards the vertex; ocelli complete, the anterior ocellus round, large and distinct, the

posterior two oval or elongate, sometimes (as in the only Indian species as yet known) round; antennæ short, flagellum cylindrical; mandibles incised in the middle of their outer margin, generally dentate in the middle on their inner side. Thorax broadly oval; pronotum small, not nearly so broad as the mesonotum, transverse; median segment short, roundly truncate posteriorly, with a well-marked space at base enclosed by convergent carinæ. Legs stout, spinose; anterior tarsi ciliated, intermediate tibiæ with one apical spine, intermediate and posterior tibiæ strongly spinose; claws simple. Fore wing with one radial and three cubital cells, the radial cell broadly obliquely truncate and with an appendicular cell; the 1st cubital cell long, in all the species known to me longer than the 2nd and 3rd cubital cells united; the 2nd cubital cell broadly triangular, very often petiolate, receiving both recurrent nervures; the 3rd much broader on the radial than on the cubital nervure, the lower apical angle of the cell generally rounded, the cubital nervure not continued beyond the apex of the cell. Abdomen never petiolate, elongately conical, the margins of the segments broadly depressed and constricted; the end segment with a well-developed pygidial area bare and punctured; the 2nd ventral segment obtusely produced in the middle.

The European species *P. flavipes*, Fabr., is said to provision its nest with various species of hymenopterous insects. Dufour gives a list of 18 genera, species of which were found among the victims of *P. flavipes*.

*405. **Palarus orientalis**, *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 422, ♂.

? Palarus interruptus, *Dahlb. Hym. Eur.* i, p. 468, ♀.

"♂. Length 8 mm. Black, head and thorax variegated with pale yellow. Abdomen above, the apical segment excepted, with pale yellow, slightly interrupted transverse bands. Legs for the great part yellow. Wings hyaline. The front wide, strongly convex; the distance between the eyes nearly equal to the length of the 2nd–6th joints of the flagellum of the antennæ. Antennæ somewhat thick, the joints beneath not produced. The 2nd and 3rd joints of the flagellum equal, half as long again as the 1st. The posterior ocelli normal, round, not flattened, the anterior ocellus slightly smaller; the distance between the ocelli and the eyes not greater than between the ocelli themselves. Anterior legs normal. Mesonotum shining, punctured. Median segment distinctly punctured, with a broad medial groove. The 3rd ventral segment without any gibbosity. The apical abdominal segment with an acute spine on each side; pygidial area distinct, somewhat flat, in part rugosely punctured, and slightly carinated medially.

"♀ unknown.

"*Hab.* Ceylon." Unknown to me.

Genus MISCOPHUS.

Miscophus, *Jurine, Hym.* p. 205 (1807).

Type, *M. bicolor*, Jur.

Range. Palæarctic, Neotropical, and Oriental regions.

All the known species are of small size, 3–10 mm. in length, and have the general facies of *Larra* and allied genera. The mandibles with an incision on the outer margin close to the middle, the inner margin not toothed, the apex simple; base of the antennæ low down on the front; the flagellum filiform; eyes very slightly convergent towards the vertex; ocelli complete, round, and placed in a somewhat long triangle just below the vertex; vertex broad, transverse; pronotum scarcely at all depressed beneath the level of the mesonotum; median segment as long as the mesonotum or slightly longer, the apex more or less truncate; legs longish, stout, the intermediate tibiæ with two apical spines. Wings ample, the fore wing with one radial and two cubital cells, the radial cell not appendiculate; the 1st cubital cell large, receiving the 1st recurrent nervure near the apex, the 2nd cubital cell triangular, petiolate, receiving the 2nd recurrent nervure almost at the apex. Abdomen pseudosessile, the apical segment without a pygidial area, conical.

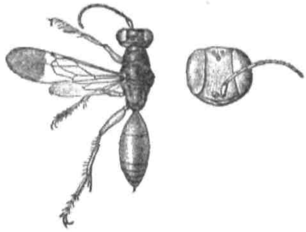

Fig. 53.
Miscophus rothneyi, ♀. $\frac{3}{1}$.

Only one species is, as yet, known from India: it is in the collection of Mr. G. A. James-Rothney, and was placed in the collection above the label *Notogonia pulchripennis** by Mr. Cameron (probably overlooked). The European species are said to provision their nests with spiders.

406. **Miscophus rothneyi**, n. sp.

♀. Head, thorax, and abdomen opaque, very densely pruinose; clypeus transverse, its anterior margin very widely arched; pronotum in front with three or four transverse striæ; median segment long, as long as the rest of the thorax, flat above, somewhat compressed at the sides, the apex truncate, a faint medial longitudinally impressed line from base not reaching the verge of the truncation, with a broad vertical furrow on the latter; legs

* The description of *Notogonia pulchripennis*, Cam., would, in part, answer for the insect I have described above, which is a *Miscophus*, and not a *Notogonia*. I have failed to identify Mr. Cameron's *N. pulchripennis*.

moderately stout and long, slightly spinose and shining; abdomen about the length of the thorax and head together. Head, thorax, and base of the coxæ of the legs black; the apex of the coxæ, the trochanters, femora, tibiæ, and tarsi, and the abdomen pale red; the mandibles, palpi, anterior margin of the clypeus, scape and basal joint of the flagellum of the antennæ reddish testaceous; the whole insect except on the legs covered with a glittering silvery pile, giving it a curious frosted look; wings hyaline, apex of the fore wing very broadly dark fuscous and effulgent; nervures and the tegulæ pale testaceous.

Hab. Jeypore. ♀. *Length* 8; *exp.* 15 mm. Type in coll. Rothney.

Genus **GASTROSERICUS**.

Gastrosericus, *Spin. Ann. Soc. Ent. Fr.* 1838, p. 480; *Dahlb. Hym. Eur.* i, p. 467 (1845); *Smith, Cat.* iv, p. 308 (1856); *Kohl, Verh. zool.-bot. Ges. Wien,* 1884, p. 408.

Type, *G. waltlii.*

Range. Palæarctic and Oriental regions.

Head a little wider than the thorax; mandibles incised in the middle of their outer margins; eyes only slightly convergent towards the vertex; antennæ in the male straight, not convolute; anterior ocellus normally formed, round, the posterior two ocelli lengthened, flat, and placed on a convexity behind which the vertex and front are punctured; pronotum depressed below the level of the mesonotum; median segment formed as in the species of *Tachysphex,* steeply sloped posteriorly with the sides perpendicular, and nowhere is its area divided by impressed lines or folds. Wings—fore wing with one radial and only two cubital cells; the radial cell broadly truncate at apex, the appendix slight; 1st cubital cell very long, receiving the 1st recurrent nervure towards its apex, the 2nd trapeziform, nearly triangular, receiving the 2nd recurrent nervure about the middle. Legs with the tibiæ and tarsi spinose, anterior tarsi ciliated, the cilia moderately long, but fine and soft; intermediate tibiæ with one apical spur; the posterior margin of the abdominal segments with transverse pilose bands; anal segment with the pygidial area well-developed in the female, subtriangular and set with stiff hairs.

Key to the Species.

a. Abdomen wholly black .... *G. rothneyi,* p. 216.
b. Abdomen, basal two segments red .... *G. wroughtoni,* p. 217.

407. **Gastrosericus rothneyi,** *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 147.

♀. Vertex of the head and thorax very minutely and closely punctured; abdomen pruinose, the surface finely longitudinally

aciculate; clypeus broad, produced anteriorly in the middle, the apex transverse, the front and clypeus densely pubescent; the eyes parallel, the ocellar region raised; median segment with a very slight slope from base and slightly narrowed posteriorly, the apex truncate, above finely transversely striate, the sides densely pubescent; abdomen with the posterior margins of segments 1–5 with transverse pubescent bands, the pygidial area densely pubescent. Black; the tubercles, the knees, a line on the tibiæ behind, with the apical joint of the tarsi, white; pubescence glittering silvery, with in some lights a golden tint; wings hyaline, very faintly fuscescent at apex.

Var. The apex of the scape and the whole of the tibiæ and tarsi white. In one specimen the neuration is aberrant, a portion of the radial nervure being obsolete, the 1st cubital and radial cells are merged in one.

Hab. Barrackpore, Bengal; Tenasserim. ♀. *Length* 6–7; *exp.* 11–13 mm.

*408. **Gastrosericus wroughtoni**, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 147.

Head wider than the thorax, pubescent; thorax punctured and densely pubescent; abdomen longer than the thorax, the surface finely aciculate; clypeus anteriorly truncate; vertex of head indistinctly furrowed, ocelli surrounded by a deep groove; median segment steeply sloped posteriorly, almost truncate, above and on the sides finely rugose; pygidial area bare, punctured. Black, the pubescence white, getting greyish on the thorax; the clypeus, the face in front, the cheeks, legs, and posterior margins of segments 1–5 with silvery pile; the tegulæ, the anterior tibiæ and tarsi, and the basal two segments of the abdomen red; wings hyaline.

Hab. None given, but probably Poona, Bombay Presidency. ♀? ♂? *Length* 11 mm. Unknown to me.

Genus **PISON**.

Pison, *Spin. Ins. Lig.* ii, fasc. 4, p. 255 (1808).
Tachybulus, *Latr. Gen. Crust. et Ins.* iv, p. 75 (1809).
Nephridea, *Brullé, Ann. Soc. Ent. Fr.* ii, p. 408 (1833).
Pisonitus, *Shuck. Tr. Ent. Soc.* ii, p. 79 (1837).
Pisonoides, pt., *Smith, Jour. Linn. Soc.* ii, p. 104 (1858).
Parapison, pt., *Smith, Trans. Ent. Soc.* 1869, p. 298, pl. vi, fig. 6.

Type, *P. ater*, Spin.

Range. Both hemispheres.

Head as wide as the thorax or wider; mandibles without an incision on their outer margins, small, when closed concealed beneath the margin of the clypeus; eyes convergent anteriorly, their inner orbits emarginate; ocelli complete, round; pronotum level with the mesonotum or depressed below it; median segment

truncate at apex or steeply sloped; legs simple, intermediate tibiæ with one apical spur. Neuration of the wings variable*—fore wing with one radial cell not appendiculate, three or, by the obliteration of the 2nd transverse cubital nervure, two cubital cells (Smith's genus *Parapison*): when three cubital cells are present, the 1st receives the 1st recurrent nervure near or at the extreme apex, the 2nd cell receives the 2nd recurrent nervure in the middle, or near or at the extreme apex, sometimes the 2nd recurrent nervure is received near the base of the 3rd cubital cell; when only two cubital cells are present each receives a recurrent nervure, the 1st cell at the apex, the 2nd at or near the base. Abdomen pseudosessile, with the margins of the basal two or three segments constricted above.

Fig. 54.—*Pison argentatum*, ♀. 1/1.

Key to the Species.

A. Fore wing with three cubital cells.	
a. Head, thorax, and abdomen with silvery pile.	
a'. Median segment posteriorly truncate or concavo-truncate.	
a^2. Basal abdominal segment closely, remainder sparsely punctured	*P. rugosum*, p. 218.
b^2. Abdomen with only a few scattered punctures	*P. suspiciosum*, p. 219.
c^2. Abdomen impunctate, smooth and shining	*P. punctifrons*, p. 219.
b'. Median segment rounded posteriorly, not truncate.	
a^2. Median segment with a wide medial longitudinal furrow bearing a carina down the middle	*P. argentatum*, p. 220.
b^2. Median segment with no furrow, coarsely obliquely striate	*P. striolatum*, p. 220.
b. Head, thorax, and abdomen with golden pile	*P. kohlii*, p. 220.
B. Fore wing with two cubital cells.	
a. Legs conspicuously red	*P. erythropus*, p. 221.
b. Legs piceous brown.	
a'. Scutellum and postscutellum longitudinally furrowed. L. 9–10 mm......	*P. agile*, p. 222.
b'. Scutellum not furrowed. L. 7 mm....	*P. rothneyi*, p. 221.
c. Legs black, no tint of red or brown......	*P. obliteratum*, p. 222.

Division A.—*Fore wing with three cubital cells.*

409. **Pison rugosum**, *Smith, Cat.* iv, p. 313, ♀; *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 188; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 118.

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* I have taken specimens of *Pison* with three cubital cells in one fore wing, only two in the other. Such seems also to be the case with the allied genus *Taranga*, Kirby. Kohl unites *Taranga* to *Pison*; but from a careful examination of the type, I have come to the conclusion that they are distinct.

♀ ♂. Head and thorax thinly pubescent; abdomen smooth and shining, with the base of the 1st and the apical margins of the basal four segments thinly pubescent; head in front rather closely and coarsely punctured, a transverse obscure furrow on the vertex behind the ocelli; mesonotum in front, scutellum and postscutellum *more sparsely punctured, shining; median segment at base coarsely* and obliquely striate, the apex concavo-truncate, a medial longitudinal furrow from base to verge of truncation, the furrow and the truncation transversely striate; abdomen with the basal segment strongly, the others sparingly punctured. Black; the pubescence silvery, dense on the clypeus, front, sides and apex of the median segment; wings hyaline, nervures and tegulæ testaceous, the 2nd recurrent nervure received in the middle of the 2nd cubital cell.

Hab. Mainpuri, N.W.P.; Calcutta; Poona; Burma; Tenasserim. ♀. *Length* 9–10; *exp.* 16 mm. ♂. *Length* 8; *exp.* 16 mm.

410. **Pison suspiciosum,** *Smith, Jour. Linn. Soc.* 1858, p. 104, ♀; *id. Trans. Ent. Soc.* 1869, p. 291; *Kohl, Verh. zool.-bot. Ges. Wien,* 1884, p. 188; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 118.

♀ ♂. Very closely allied to *P. rugosum*, Smith, and resembling it; but differing from that species in the shape of the median segment, which is roundly truncate with a medial longitudinal furrow, the furrow smooth and shining, not transversely striate; in the abdomen having only a few scattered delicate punctures, with the base of the 2nd segment always transversely striate; and in the neuration of the wings, the 2nd recurrent nervure being received at the apex and not in the middle of the 2nd cubital cell. These differences seem constant.

Hab. Burma; Tenasserim; Singapore. ♀ ♂. *Length* 8–9; *exp.* 16–17 mm.

411. **Pison punctifrons,** *Shuck. Trans. Ent. Soc.* ii, 1837, p. 77, ♀; *Smith, Cat.* iv, p. 313; *Kohl, Verh. zool.-bot. Ges. Wien,* 1884, p. 188; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 118.

♀ ♂. Head and thorax coarsely and closely punctured, the latter especially more so than in the closely allied species *P. rugosum*; a deep transverse furrow on the vertex behind the ocelli; median segment coarsely obliquely striate, the apex truncate, the truncation transversely striate; a medial longitudinally impressed thin line from base to apex of segment, widening on the verge of the truncated portion into a shining fovea; the clypeus, the front, sides and apex of the median segment with thin long soft pubescence; abdomen smooth and shining, the sides of the segments posteriorly broadly pilose. Black, the pubescence silvery; the wings hyaline, their apical margins narrowly fuscescent, the recurrent nervures interstitial with 1st and 2nd transverse cubital nervures.

Hab. North-West Provinces; Sikhim; Burma; Tenasserim. ♀ ♂. *Length* 10–12; *exp.* 18–23 mm.

412. **Pison argentatum.**

Pisonitus argentatus, *Shuck. Trans. Ent. Soc.* ii (1837), p. 79, ♀.
Pison argentatus, *Smith, Cat.* iv, p. 314.
Pison argentatum, *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 186.

♀. Densely pruinose; the clypeus, sides of the face and of the median segment pubescent; the head, thorax, and median segment very minutely and closely punctured; scutellum large and prominent, a narrow rectangular depressed space at its base deeply and coarsely longitudinally striate; median segment short, rounded posteriorly, and steep, with a wide medial longitudinal furrow having a fine carina down the middle, the sides of the furrow obscurely obliquely striate; abdomen shining, the posterior margins of the basal four segments with broad transverse pilose bands, the basal with its apical margin deeply, the 2nd segment with its apical margin slightly depressed and constricted. Jet-black, the pubescence on the clypeus, face in front, and sides of the median segment silvery, the rest of the head and thorax covered with a thin silvery pile, the transverse bands on the abdomen very brilliant silvery; wings hyaline, the apical margins broadly fuscescent.

Hab. Mauritius; Bombay; Bangalore; Tenasserim. ♀. *Length* 8; *exp.* 15 mm. ♂ somewhat smaller.

413. **Pison striolatum,** *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♂. Head closely punctured, a small space beneath the anterior ocellus smooth, the clypeus and sides of the face densely pruinose; the anterior margin of the clypeus produced in the middle, emarginate at the sides; thorax closely and coarsely punctured; median segment roundly truncate posteriorly, coarsely obliquely striate and rugose; abdomen impunctate, shining, slightly pruinose, the base of segments 2–4 constricted. Black, the flagellum of the antennæ, the anterior tibiæ and tarsi, the intermediate and posterior tarsi, and the apical two or three segments of the abdomen obscurely piceous.

Hab. Mussooree. ♂. *Length* 8; *exp.* 14 mm. Type in coll. Rothney.

414. **Pison kohlii,** n. sp.

♀. Head, pro- and mesonotum, scutellum and postscutellum very finely and closely punctured; the clypeus and front as far as the sinus of the eyes, the cheeks, a line on the pronotum, the sides and apex of the mesonotum, the apex of the median segment, and the posterior margins of the basal four segments of the abdomen densely pilose or pubescent; the median segment short, roundly concavo-truncate posteriorly, above with coarse longitudinal striæ and a medial longitudinal fossulet, continued over the verge of the truncated portion as a narrow impressed line, the face of the truncation transversely striate; abdomen long, massive, a little

longer than the head and thorax together. Black, the pubescence on the clypeus and apex of the median segment, and the silky pile on the head, the thorax, and on the margins of the abdominal segments shining golden; wings hyaline, the apical margins narrowly fuscescent, nervures and tegulæ testaceous.

Hab. Tenasserim. ♀. *Length* 11; *exp.* 20 mm. Allied to but quite distinct from *P. aurifex*, Smith, and other related Australian species.

Division B.—*Fore wing with two cubital cells.*

415. **Pison erythropus.**

Parapison rufipes, *Smith* (*nec* Pisonitus (=Pison) rufipes, *Shuck. Trans. Ent. Soc.* ii, p. 79), *Trans. Ent. Soc.* 1869, p. 299, ♀.

Pison erythropus, *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 186; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 117.

♀ ♂. Head, thorax, and abdomen finely and closely punctured and shining; the clypeus, front of the face, emargination of the eyes, occiput, cheeks, a line on the posterior border of the pronotum, the sides of the median segment, and distinct moderately broad transverse fasciæ on the posterior margins of abdominal segments 1–4 above pubescent or pilose; the clypeus and front boldly convex; the median segment rounded, posteriorly divided by a medial longitudinal deep furrow, the base of the segment with a row of short longitudinal striæ; the abdomen pseudosessile, about the length of the head and thorax together, the apical margins of the basal three segments constricted. Black, the pubescence and pile silvery; the trochanters, femora, tibiæ, and tarsi of the legs red; the posterior margins of the basal five segments of the abdomen testaceous; the wings hyaline, nervures and tegulæ testaceous.

Hab. North-West Provinces. ♀ ♂. *Length* 8–9; *exp.* 14–17 mm.

416. **Pison rothneyi,** *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♀. Head, thorax, and abdomen shining, very closely punctured, the punctures minute and very shallow; the clypeus densely, the rest of the head, the thorax, and abdomen thinly pruinose; median segment with a medial longitudinal furrow from base not quite reaching the apex of the segment, which latter is slightly concave and densely pubescent; abdomen with the base of the 2nd strongly, of the 3rd segment slightly constricted. Black; the apical four joints of the flagellum of the antennæ and the legs more or less obscurely piceous; the posterior margins of segments 1–5 of the abdomen narrowly shining testaceous; the clypeus with silvery pile; the pubescence on the apex of the median segment fuscous; wings hyaline, nervures and tegulæ testaceous.

Hab. Barrackpore, Bengal. ♀. *Length* 7; *exp.* 14 mm. Type in coll. Rothney.

417. **Pison agile.**

Parapison agilis, *Smith, Trans. Ent. Soc.* 1869, p. 300, ♀.
Pison agile, *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 186; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 117.

♀. Closely resembles *P. erythropus*, Kohl, but is a larger, more stoutly built insect, with the legs piceous brown, not red, and differs also in the eyes being more convergent at top, the scutellum and postscutellum being divided by a medial longitudinal very shallow furrow; the median segment is slender, with a steeper slope to the apex, and the abdomen is much larger and broader.

Hab. Ceylon. ♀. *Length* 9–10; *exp.* 11–20 mm. ♂ slightly smaller.

418. **Pison obliteratum.**

Pisonoides obliteratus, *Smith, Jour. Linn. Soc.* 1858, p. 104, ♀.
Parapison obliteratus, *Smith, Tr. Ent. Soc.* 1869, p. 299.
Pison obliteratum, *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 187; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 117.

♀ ♂. Head, thorax, and median segment finely but not very closely punctured; abdomen highly polished, shining; the whole head, thorax, and abdomen covered with a thin erect pubescence; the clypeus, the emargination of the eyes, and transverse bands on the posterior margins of abdominal segments 2–4 with dense silky pile, the last only observable in certain lights; median segment rounded posteriorly, with a steep slope to the apex, a triangular depressed space at base, bearing coarse oblique striations, from which a deep furrow runs to the apex of the segment, the furrow with a few coarse transverse striæ; abdomen with the base of the 1st segment narrowed, almost petiolate, the apex deeply constricted. Black, the abdomen with an obscure chalybeous tint, the apical margins of segments 2–4 testaceous; the thin erect pubescence whitish, the pile on the clypeus and abdominal bands silvery; wings hyaline, nervures and tegulæ brownish testaceous.

Fig. 55.—*Pison obliteratum*, ♀. ⁴⁄₁.

Hab. Kumaun, North India; Maulmain, Tenasserim; Borneo. ♀ ♂. *Length* 8–9; *exp.* 15–16 mm.

Genus **TRYPOXYLON.**

Sphex, pt., *Linn. Syst. Nat.* ed. x, t. i, p. 569 (1758).
Trypoxylon, *Latr. Précis Caract. Gen. Ins.* p. 121 (1796).
Apius, *Jurine, Hym.* i, p. 140 (1807).

Type, *T. figulus* (Linn.).

Range. Both hemispheres.

Head as wide as the thorax or a little wider; mandibles small, when closed concealed beneath the clypeus, their outer margin not incised; eyes more or less convergent below, their

inner orbits with a deep indentation or sinus; front and vertex often raised and produced in various ways, shield-shaped, strongly convex, &c.; ocelli three, complete, round; pronotum on a level with or depressed beneath the mesonotum; median segment never truncate posteriorly, usually with a more or less steep slope at apex; legs short, simple, or very feebly spined, intermediate tibiæ with one apical spur. Wings usually short in proportion to length of body, the row of hooklets on the costal margin of the posterior

Fig. 56.—*Trypoxylon*: fore wing.

wing interrupted in the middle; fore wing with one radial cell not truncate at apex nor appendiculate, and two cubital cells, but the 2nd almost obsolete, defined by such faint nervures that it is somewhat difficult to detect except in a strong light: abdomen elongate, basal segment formed into a slender petiole, 2nd segment petiolate at base, usually very slightly increasing in thickness towards the apex, 3rd a little thicker, 4th and 5th subequal; apical segment in female conical acute, in male arched or truncate.

The species of this genus construct their nests of clay, making delicate little shells, granular on the outside and somewhat lengthened in shape; these they store with minute spiders as food for their larvæ. Horne found their nests built on straws; I have only once found a nest so built.

Trypoxylon pileatum, which is very common in Burma, usually selects the folds of an unopened newspaper lying on the table in the verandah, or the ends of a closed book, on which to construct its fragile little nests. I have also seen *T. bicolor* carrying clay to an old nail- or screw-hole in the walls or doors of the house.

Key to the Species.

A. Median segment with a medial longitudinal furrow, and two lateral convergent furrows enclosing a triangular space at base of segment.
  a. Head produced into a shield-shaped prominence on front. . . . . *T. pileatum*, p. 224.
  b. Front with a more or less marked furrow down the middle.
    a'. Triangular space at base obscurely transversely striate. . . . . *T. intrudens*, p. 224.
    b'. Triangular space at base smooth.
      a². Medial furrow broad, transversely striate, continued down to apex of segment. . . . . *T. canaliculatum*, p. 225.
      b². Medial furrow comparatively narrower, interrupted about middle of the segment by a transverse hollow . . . . *T. buddha*, p. 225.

B. Median segment with a medial longitudinal but no lateral furrows.
 a. Stoutly made and densely pubescent; pubescence and pile on head and thorax golden .... *T. coloratum*, p. 226.
 b. More slenderly made, pubescence not so dense; pubescence and pile on head and thorax silvery.
  a'. Front above base of antennæ with a small tubercle .... *T. obsonator*, p. 226.
  b'. Front with a carina between base of antennæ.
   a^2. Legs wholly black .... *T. rejector*, p. 226.
   b^2. Legs black, variegated with rufo-testaceous.
    a^3. Abdomen black, 2nd and 3rd segments red .... *T. bicolor*, p. 227.
    b^3. Abdomen red, basal segment (petiole) only black.............. *T. gracilescens*, p. 227.

419. **Trypoxylon pileatum**, *Smith, Cat.* iv, p. 377, ♀; *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 206; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 119.
Trypoxylon nigricans, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 119.

♀ ♂. Head—the clypeus densely pilose, the front above the antennæ produced into a shield-shaped form rounded above, triangular, and running into a sharp carinated point below between the bases of the antennæ; from the lateral angles of the shield a short carina runs into the emargination of the eyes, beneath which on each side the face is hollowed and smooth; the anterior ocellus is placed in the top of the shield, the posterior two ocelli above it; mesonotum, scutellum, and post-scutellum smooth and shining; median segment with an enclosed subtriangular space at base, the enclosure with a medial transversely striate furrow continued down from the apex of the enclosed space to the apex of the segment; pleuræ, sides and apex of the median segment pilose; abdomen smooth, more than twice the length of the head and thorax united. Black, with glittering silvery pile; wings hyaline, nervures testaceous.

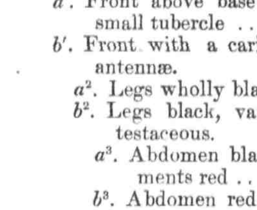

Fig. 57.—*Trypoxylon pileatum*, ♀. $\frac{3}{2}$.

Hab. Barrackpore, Bengal; Madras; Ceylon; Burma; Tenasserim. ♀ ♂. *Length* 9–12; *exp*. 14–16 mm.

420. **Trypoxylon intrudens**, *Smith, Trans. Zool. Soc.* vii, 1872, p. 188, ♀; *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 205; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 119.

♀ ♂. Head minutely and somewhat closely punctured, the

punctures shallow; the clypeus, front up to the emargination of the eyes, and cheeks delicately pilose; a shallow vertical furrow from the anterior ocellus meeting a short carina running up from between the base of the antennæ; thorax smooth, shining, and sparsely punctured; a line on the pronotum, the sides and apex of the mesonotum, the pleuræ, and the sides and apex of the median segment pilose; median segment long, steeply sloped at apex; a transversely striate and medially furrowed triangular space at base enclosed by deep posteriorly convergent furrows; the obliquely truncated portion also with a medial furrow; abdomen long, about twice the length of the head and thorax united. Black, with glittering silvery pile; the 2nd and 3rd abdominal segments red, shaded with fuscous above; legs testaceous, variegated with black; wings hyaline and iridescent; nervures and tegulæ pale testaceous.

Hab. North-West Provinces, India; Ceylon; Burma. ♀ ♂. *Length* 9–10; *exp.* 12–15 mm.

421. **Trypoxylon canaliculatum,** *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, pp. 118, 122.

♀. Closely allied to and resembling *T. intrudens*, Smith, but the eyes beneath are closer, the clypeus is bluntly carinated in the middle, the apex recurved; the median segment has a more gradual slope and the enclosed triangular space at its base is smooth, the medial and lateral furrows only being transversely striate.

Hab. Barrackpore; Tirhoot; Mussooree. ♀. *Length* 8–10; *exp.* 12–13 mm.

422. **Trypoxylon buddha,** *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, pp. 118, 119.

♀. Head, thorax, and abdomen shining, covered all over with a very thin short pubescence; clypeus and the emargination of the eyes densely pilose: the front raised, convex, divided by a deep furrow which joins on below to a prominent carina above the bases of the antennæ; the front covered with coarse punctures; median segment coarsely transversely striate, a subtriangular space at base enclosed by deep convergent furrows meeting about midway down the slope of the segment, the enclosed space with a medial broad furrow, beyond the apex of which the segment is transversely excavated; abdomen long, curved, the apex of the petiole swollen, larger than the apex of the 2nd segment. Jet-black, the thin short pubescence hoary white, the pile on the clypeus and face shining silvery; wings hyaline and beautifully iridescent, nervures and tegulæ testaceous brown.

Hab. Barrackpore, Bengal. ♀. *Length* 9; *exp.* 12 mm. ♂ unknown. Type in coll. Rothney.

423. **Trypoxylon coloratum,** *Smith, Jour. Linn. Soc.* 1858, p. 106, ♂; *Kohl, Verh. zool.-bot. Ges. Wien,* 1884, p. 203; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 118.

♀. Not so slenderly made as the majority of the species of this genus. Head, thorax, and abdomen densely pubescent, the pubescence long and soft on the clypeus, the front cheeks behind the eyes, on the pronotum, the front, sides, and apex of the mesonotum, the scutellum, postscutellum, median segment, and pleuræ, shorter and less dense on the abdomen; the legs pilose; the head and thorax underneath the pubescence moderately punctured: the disc of the mesonotum and the middle of the median segment smooth and shining; the latter long, with a gradual slope to the apex, and a short medial longitudinal groove widening about midway into a deep shining broad hollow, and another longer wider fovea on the slope of the segment; clypeus long, subtriangular, convex, the apex broadly rounded; the front with a small tubercle above the base of the antennæ. Black, the pubescence golden; the mandibles, the apical margin of the clypeus, the scape and basal four joints of the flagellum of the antennæ, the posterior margin of the pronotum, the tubercles, the petiole of the abdomen beneath, the base of the 2nd and 3rd, and the apical margins of the 3rd, 4th, and 5th segments above pale testaceous red; the legs testaceous, variegated with black; wings hyaline and iridescent, nervures and tegulæ testaceous.

♂ similar, the abdomen more or less rufo-fuscous with the apex pale.

Hab. Tenasserim; Borneo. ♀. *Length* 20; *exp.* 28 mm. ♂ slightly smaller. Type in the British Museum.

424. **Trypoxylon obsonator,** *Smith, Trans. Ent. Soc.* 1873, p. 194, ♀ ♂; *Kohl, Verh. zool.-bot. Ges. Wien,* 1884, p. 205.

♀. Closely resembles *T. bicolor*, but is constantly larger, the front above the base of the antennæ bears a small tubercle instead of a carina, the medial furrow on the median segment is broader and not interrupted in the middle, and the head and thorax are more densely pubescent and pilose.

♂. Differs from the female in having the antennæ black beneath, not rufo-fulvous, and a fuscous patch at the base of the 2nd abdominal segment above.

Hab. Tenasserim; Japan. ♀ ♂. *Length* 15-18; *exp.* 26–28 mm.

*425. **Trypoxylon rejector,** *Smith, Trans. Zool. Soc.* vii, p. 189, ♀, pl. xxi, fig. 4 *a*; *Kohl, Verh. zool.-bot. Ges. Wien,* 1884, p. 206; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 119.

"♀. Length $5\frac{1}{4}$ lines (11 mm.). Black, with the 2nd and 3rd segments of the abdomen red, the legs black.

"Head, the clypeus, and the emargination of the eyes silvery; tips of the mandibles ferruginous, the palpi pale testaceous; an impressed line in front of the anterior ocellus, terminating at an

elevated carina just before the insertion of the antennæ. Thorax smooth and shining on the disc; the sides of the metathorax with silvery pubescence, and a smooth enclosed space at its base divided by a central channel, beyond the enclosure it divides into a deep and wide fossulet: wings subhyaline, their apical margins clouded and beautifully iridescent; legs entirely black. Abdomen with a long petiole, smooth and shining; the second and third segments red, their apical margins more or less fuscous.

"*Hab.* Mainpuri, North-West Provinces.

"This species was bred from cells constructed by *Pterochilus pulchellus.*"

426. **Trypoxylon bicolor.** (Pl. II, fig. 5.)

Smith, Cat. iv, p. 377, ♀; *Kohl, Verh. zool.-bot. Ges. Wien*, 1884, p. 203; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 118.
Trypoxylon accumulator, *Smith, Trans. Ent. Soc.* 1875, p. 38, ♀.
Trypoxylon tinctipennis, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, pp. 119 & 121.

♀ ♂. Clypeus, the front above the antennæ, the emargination of the eyes, the cheeks, the pronotum in front, the sides and apex of the mesonotum, the sides of the median segment, and the pleuræ pubescent; the pubescence or pile dense on the clypeus, the cheeks, pleuræ, and sides of the median segment; the front and vertex of the head minutely and closely punctured, somewhat opaque; the antennal carina short, prominent: the front vertically furrowed; the pro- and mesonotum, scutellum, postscutellum, and median segment smooth and shining in the middle, the last with a subinterrupted medial longitudinal furrow, broadening above and below the posterior slope of the segment; abdomen smooth and shining, obscurely pilose. Black, the pubescence silvery: the mandibles, the anterior tibiæ in front, the tarsi, the base of the intermediate and posterior tibiæ and tarsi rufo-testaceous; the apex of the petiole and the 2nd and 3rd segments of the abdomen ferruginous red; wings hyaline and iridescent, the nervures and tegulæ testaceous.

Hab. Sikhim; Burma; Tenasserim; Singapore; Java. ♀ ♂.
Length 12–15; *exp.* 18–23 mm.

427. **Trypoxylon gracilescens,** *Smith, Jour. Linn. Soc.* 1861, p. 85, ♀.

♀. Clypeus, front to a little above the base of the antennæ, the sinus of the eyes, the inner narrowly and the outer orbits broadly, a line on the pronotum, the sides and apex of the mesonotum and of the median segment densely pilose, the rest of the head and thorax smooth and shining; the front divided by a vertical furrow, on each side of which the face is convexly raised; median segment with a medial longitudinal slight furrow from base to verge of oblique portion of segment, thence to apex broadly channelled; abdomen smooth. Head, thorax, and petiole of abdomen black; the apex of the clypeus, the scape of the antennæ,

and the legs, except the bases of all the coxæ and the posterior femora in the middle, testaceous; mandibles ferruginous, flagellum of the antennæ piceous; 2nd and succeeding segments of the abdomen red, the pile on the head and thorax bright silvery; wings hyaline and iridescent, nervures brown, tegulæ pale testaceous.

Hab. Not uncommon in Southern Tenasserim; described originally from Makassar in Celebes. ♀. *Length* 13; *exp.* 20 mm. ♂ unknown.

Genus **AMMOPHILA.**

Sphex, pt., *Linn. Faun. Suec.* p. 411 (1761).
Pompilus, pt., *Fabr. Ent. Syst. Supp.* p. 246 (1798).
Pelopœus, pt.; Pepsis, pt., *Fabr. Syst. Piez.* pp. 202 & 207 (1804).
Ammophila, *Kirby, Trans. Linn. Soc.* iv, p. 195 (1804).
Psammophila, pt., *Dahlb. Hym. Eur.* i, p. 431 (1845).
Parapsammophila, pt., *Taschenb. Zeitschr. ges. Nat. Sachs. Thür* xxxiv, p. 429 (1869).

Type, *A. sabulosa*, Linn.

Range. Over both hemispheres.

In the fore wing the 2nd cubital cell receives both recurrent nervures; the third cubital is subtriangular, much narrowed towards the radial cell. The fore tarsi (♀) strongly, (♂) feebly ciliated on the outer side, with stiff hairs and spines. Body lengthened and slender, more slender than in *Sceliphron*.—The female makes burrows in the ground and stores her nest with either caterpillars or spiders.

Fig. 58.
Ammophila atripes, ♀. 1/1.

Key to the Species.

A. Petiole of abdomen two-jointed.
  a. Pro- and mesonotum, and the median segment striate.
    a'. Legs red.
      a². Median segment above reticulate, not striate, along the middle.... *A. atripes* ♀, p. 229.
      b². Median segment above transversely striate along the middle........
        a³. The middle portion of the median segment at base above raised into a V-form .... *A. humbertiana*, p. 230.
        b³. The middle portion of the median segment at base above not raised, rounded.
          a⁴. Pro- and mesonotum marked with red .... *A. dimidiata*, p. 230.
          b⁴. Pro- and mesonotum black.. *A. basalis*, p. 231.
    b'. Legs black.
      a². Median segment above reticulate, not striate, along the middle.... *A. atripes* ♂, p. 229.

b^2. Median segment above transversely or obliquely striate along the middle.
  a^3. Mesonotum raised in the middle, with a longitudinal furrow on each side .... *A. vagabunda*, p. 231.
  b^3. Mesonotum not raised in the middle nor sulcate .... *A. nigripes*, p. 231.
b. Pro- and mesonotum punctured, not striate, median segment only striate.
  a'. Legs red.
    a^2. Posterior tibiæ and tarsi black .. *A. lævigata*, p. 231.
    b^2. Posterior tibiæ and tarsi red.
      a^3. Abdomen wholly red, or red with all the segments above fuscous black...................... *A. elegans*, p. 232.
      b^3. Abdomen with segments 5 and 6 always entirely black .... *A. smithii*, p. 232.
  b'. Legs black.
    a^2. Abdomen massive, broad and slightly flat; median segment not carinated .... *A. brevipennis*, p. 232.
    b^2. Abdomen more or less cylindrical, acutely pointed at the apex, not flat; median segment with a marked medial longitudinal carina. *A. punctata*, p. 233.
B. Petiole of abdomen one-jointed.
  a. Tarsal claws unidentate.
    a'. Legs and petiole red.............. *A. fuscipennis*, p. 233.
    b'. Legs and petiole black.
      a^2. Median segment punctured, not striate .... *A. læta*, p. 234.
      b^2. Median segment obliquely striate, with a medial longitudinal furrow bearing a carina down the middle . *A. hirticeps*, p. 234.
      c^2. Median segment transverely striate above and on the sides and not furrowed.
        a^3. Abdomen red and black; wings hyaline .... *A. apicata*, p. 234.
        b^3. Abdomen wholly black; wings dark fusco-hyaline .... *A. mandibulata*, p. 234.
  b. Tarsal claws bidentate .... *A. erythrocephala*, p. 235.

A. *Petiole of abdomen two-jointed.*

428. **Ammophila atripes**, *Smith, A. M. N. H.* (2) ix, 1852, p. 46; *id. Cat.* iv, p. 217; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 93.

Ammophila simillima, *Smith, Cat.* iv, p. 217.
Ammophila pulchella, *Smith, Cat.* iv, p. 218.
? Ammophila longiventris, *Sauss. Novara-Reise, Hym.* p. 24, ♂.
Ammophila spinosa, *Smith, A. M. N. H.* (4) xii, 1873, p. 259, ♀.
Ammophila buddha, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, pp. 93 & 94.

♀. Head, legs, and abdomen smooth and shining; pronotum,

mesonotum anteriorly, and the sides of the median segment transversely striate, the scutellum and postscutellum longitudinally striate; the middle of the median segment above finely reticulate; clypeus subtriangular, slightly convex, its anterior margin arched, front at the base of the antennæ concave. Black; the femora, tibiæ, basal two joints of the tarsi, the petiole, and basal segment (2nd joint of petiole) of the abdomen red; rest of the abdomen blue-black, which colour extends more or less on to the basal segment above; the scape and basal joint of the flagellum of the antennæ dull red, the apical joints of the tarsi black; wings light fusco-hyaline with a yellowish tinge.

♂. Similar in colour and sculpture, but with the petiole of the abdomen, the legs, and the scape and basal joint of the antennæ also black, the petiole only being slightly reddish beneath; the abdomen covered with a short fine silvery pile.

Hab. India; Burma; Tenasserim; Ceylon; China. ♀. *Length* 18–30; *exp.* 36–40 mm. ♂. *Length* 23–27; *exp.* 30–33 mm.

I have carefully examined the types of *A. simillima*, *pulchella*, and *spinosa*, all in the British Museum, and compared them with the type of *atripes*, also the type of *A. buddha*, Cam., in Mr. Rothney's collection. *A. longiventris*, Sauss., I have not seen, but the description exactly corresponds with that of *A. pulchella*, Smith = *atripes* ♂.

*429. **Ammophila humbertiana,** *Sauss. Novara-Reise, Hym.* p. 25, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 93.

♀. Very closely allied and similar to *A. atripes*, Smith, of which this may only be an extreme form. According to the description it differs in sculpture of the metanotum, which is "postice oblique in **V**-formam elevato-strigato," and in the colour of the antennæ, which have the basal segments of the flagellum red.

Hab. Ceylon. ♀. *Length* 28; *wing* 17 mm.

430. **Ammophila dimidiata,** *Smith, Cat.* iv, p. 216, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 93.

♀. Head and thorax pubescent, head very finely punctured, pre- and mesonotum and median segment transversely striate, scutellum and postscutellum longitudinally striate; legs and abdomen smooth. Black; the scape, basal two joints of the flagellum of the antennæ, the pronotum, two marks anteriorly on the mesonotum, the apex of the coxæ, the trochanters, tibiæ and tarsi of legs, and the petiole and the basal segment (2nd joint of the petiole) of the abdomen red, rest of the abdomen bright metallic blue.

Var. The whole of the mesonotum, the tegulæ, and basal five joints of the flagellum of the antennæ red; wings flavo-hyaline, iridescent.

Hab. Bengal; Madras. ♀. *Length* 22–28; *exp.* 31 mm. ♂ unknown. Type in the British Museum.

431. **Ammophila basalis**, *Smith, Cat.* iv, p. 214, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 93.
Ammophila orientalis, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, pp. 93 & 96.

♀. Closely allied to *A. atripes*, Smith, but a much smaller and slighter insect, and differing in having the median segment both at the sides and above very finely transversely striate, not reticulate, and in colour in having the basal segment, and basal half, two-thirds, or whole of the following segment of the abdomen red. This coloration is constant in all the specimens I have seen.

Hab. The Punjab; N.W. India. ♀. *Length* 20–22; *exp.* 28–30 mm. ♂ unknown.

432. **Ammophila vagabunda**, *Smith, Cat.* iv, p. 218, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 94.
Ammophila spinipes, *Smith, 2nd Yark. Miss., Hym.* p. 16.

♀. Head smooth, with a few scattered shallow punctures, the front deeply concave; the clypeus depressed; pro- and mesonotum, scutellum and postscutellum strongly punctured, the mesonotum raised in the middle, with a shallow broad furrow on each side and a longitudinally impressed medial line anteriorly, the punctures running into striæ in the lateral furrows and at the apex of the mesonotum; median segment transversely striate; abdomen smooth. Black; the apical half of the 2nd joint of the petiole and the succeeding abdominal segment red, the rest of the abdomen blue-back; wings light fusco-hyaline and iridescent.

Hab. Northern India; North China; Sumatra. ♀. *Length* 22; *exp.* 25 mm.

The three specimens, all I have seen, in the British Museum are all iemales. It is possible that *A. nigripes*, Smith, is the male. However, the sculpture of the thorax is sufficiently different to keep them apart for the present.

433. **Ammophila nigripes**, *Smith, Cat.* iv, p. 215, ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 93.

♂. Head smooth, the clypeus and front pruinose; the pro- and mesonotum and median segment transversely striate, the sides of the last covered with soft, white, rather thin pubescence; scutellum and postscutellum longitudinally striate; the legs and abdomen smooth, slightly pruinose, the bases of the segments of the latter densely so. Black; the basal segment of the abdomen red, fuscous at base above, the remaining segments blue-black, the apical two with a green effulgence; wings hyaline, with a brownish iridescent effulgence; the clypeus and face in front with glistening silvery pile.

Hab. Madras; Southern India. ♂. *Length* 16; *exp.* 24 mm.

434. **Ammophila lævigata**, *Smith, Cat.* iv, p. 215, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 93; *Bingh. P. Z. S.* 1896, p. 437.

♀. Head, pro- and mesonotum, scutellum, and postscutellum

smooth, with a few fine scattered punctures; median segment coarsely punctured, rugose down the middle above, the sides transversely striate; the head in front and the sides of the thorax pruinose; the abdomen smooth, obscurely pruinose. Black, with the clypeus, the sides of the face, the tubercles, and the sides of median segment covered with glistening silvery pile; the legs, the petiole, and basal segment of the abdomen with the basal two-thirds of the 2nd segment red; the coxæ and trochanters of all the legs, and the femora above, tibiæ at apex, and tarsi of the posterior legs black, the basal two segments of the abdomen also touched with black; wings hyaline with a yellowish tinge, nervures testaceous, tegulæ reddish.

Hab. Guzerat; Madras; Bangalore; Ceylon. ♀. *Length* 20; *exp.* 24 mm.

435. **Ammophila elegans**, *Smith, Cat.* iv, p. 216, ♀ ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 93.

♀. Head and thorax densely pruinose; legs and abdomen smooth; head, pro- and mesonotum very closely and finely punctured under the thick pilose coating; the median segment finely transversely striolate. Black; the clypeus, apex of the coxæ, the trochanters, femora, and tarsi of the legs, and the abdomen pale red; the head and thorax covered with a dense glistening silvery pile; the posterior coxæ, trochanters, and femora above, the basal segment of the abdomen above, except at apex, and a spot above at the bases of the 2nd and 3rd segments, black; wings clear hyaline.

♂ similar, but has the whole abdomen shaded with black spots above.

Hab. Punjab; Bombay. ♀. *Length* 22; *exp.* 28 mm. ♂. *Length* 21; *exp.* 26 mm.

*436. **Ammophila smithii**, *Baly, MS. teste Smith, Cat.* iv, p. 217, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 94.

♀. "Black, the head and thorax covered with silvery pile, which is very dense on the face, cheeks, and thorax beneath, the coxæ and sides of the metathorax; the scape, anterior margin of the clypeus, and the mandibles ferruginous, the latter black at their tips; the legs red, the intermediate and posterior tarsi fusco-ferruginous. The first joint of the petiole fusco-ferruginous, the second with a black spot at its base above; the abdomen red, the fourth segment having a large black spot in the centre of its apex, and the fifth and sixth segments being entirely black.

"*Hab.* India. ♀. *Length* 10½ lines (=21 mm.)."

437. **Ammophila brevipennis**, n. sp.

♀. Head and thorax in front smooth and shining, the clypeus flat, semicircular, and pilose, the head and thorax sparsely covered with long hairs; the pro- and mesonotum, scutellum, and post-scutellum marked by scattered punctures; mesonotum markedly

elevated in the middle, with a longitudinal broad, rather shallow furrow on each side above the tegulæ; median segment finely transversely striate; petiole short; abdomen broad, somewhat vertically flattened and subfusiform, the basal segment (*i. e.*, 2nd joint of the petiole) nearly cylindrical, very little broadened towards the apex, the following segment campanulate. Intensely black, the clypeus with short black pile; the petiole, the basal two segments of the abdomen and the base of the 3rd bright vermilion-red; wings flavo-hyaline, the apical margins beyond the cells broadly fuscescent.

Hab. Bombay. ♀. *Length* 23; *exp.* 22 mm. ♂ unknown. Type in the British Museum.

438. **Ammophila punctata**, *Smith, Cat*, iv, p. 218, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 93.

Ammophila vischu (? vishnu), *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, pp. 94 & 98.

♀. Head, pro- and mesonotum punctured; scutellum, post-scutellum, and median segment coarsely rugose, the last transversely striate at the sides and above and with an obscure fine medial longitudinal carina; the face in front, the tubercles, and sides of the thorax with glistening silvery pile; abdomen smooth, opaque. Black, the apex of the 1st and the two following segments of the abdomen red: wings light fusco-hyaline, with the apical margins slightly darker; nervures testaceous, tegulæ black.

♂ similar, but with the red portion of the abdomen shaded with black.

Hab. Northern India: Mussooree; Sikhim; Burma. ♀. *Length* 18; *exp.* 25 mm. ♂. *Length* 17; *exp.* 26 mm.

B. *Petiole of abdomen one-jointed.*

439. **Ammophila fuscipennis**, *Smith, Trans. Zool. Soc.* vii, p. 187, ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 93.

♂. Head and thorax with a short sparse pubescence, the face in front densely pilose; the clypeus large, subtriangular, with a shallow furrow down the middle, the anterior margin recurved, slightly projecting, transverse in the middle, with the sides oblique; head closely punctured, the pro- and mesonotum, scutellum, post-scutellum, and the enclosed space on the median segment above coarsely and closely punctured, the punctures running into oblique striæ at the apex of the mesonotum and into longitudinal striæ on the scutellum and postscutellum; the median segment at apex transversely and on the sides finely obliquely striate; petiole and abdomen smooth. Black; the scape of the antennæ, the trochanters, femora, tibiæ, and tarsi (except the apical joint, which is fuscous black) of the legs, and the petiole red; wings fusco-hyaline.

Hab. North-West Provinces. ♂. *Length* 22; *exp.* 34 mm. ♀ unknown. Type in the British Museum.

440. **Ammophila læta**, *n. sp.*

♀. Head—the vertex and front coarsely but slightly rugose; clypeus boldly convex, its anterior margin arched; pronotum, mesonotum, scutellum, and postscutellum coarsely punctured; median segment finely and very closely punctured, the punctures running into transverse striæ; petiole and abdomen smooth and shining, the latter subfusiform, acute at apex. Black, the basal three segments of the abdomen red, the head and thorax in front covered with sparsely scattered black hairs; the median segment with a soft, yellowish-white, rather thin pubescence; wings fusco-hyaline, the apical margins broadly darker.

Hab. Chaman, South Afghanistan. ♀. *Length* 19; *exp.* 28 mm. ♂ unknown. Type in the British Museum.

*441. **Ammophila hirticeps**, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, pp. 94 & 99.

"♀. Head and thorax sparsely punctured and densely pubescent; anterior margin of clypeus broadly rounded, almost sinuate in the middle; scutellum indistinctly longitudinally striate; the median segment obliquely striate, with a central longitudinal furrow, which has a carina down the middle; petiole of abdomen pubescent. Black, with long black hair and silvery pubescence on the clypeus and face in front; abdomen with segments 2–4 and the base of the 5th red; wings nearly hyaline, the apex infuscate."

Hab. Gilgit. ♀. *Length* 15 mm. Type in the Indian Museum, Calcutta.

442. **Ammophila apicata**, n. sp.

♀. Head, pro- and mesonotum, scutellum, and postscutellum smooth, shining, with a few scattered fine punctures; head densely pruinose in front and thinly pubescent; median segment finely transversely striate; legs pruinose; abdomen smooth and shining, the apex of the 4th and all the 5th segment above with transverse crenulated folds. Black; the clypeus, face in front, sides of the thorax, and the legs with dense silvery pile, and some long whitish pubescence on the head and thorax; the basal three segments of the abdomen and basal half of the 4th deep red; wings hyaline and iridescent, broadly light fuscescent along the apical margin, with a dark fuscous spot at the extreme apex of the front wing; nervures testaceous brown, tegulæ black.

Hab. Bombay. ♀. *Length* 23; *exp.* 33 mm. Type in the British Museum.

443. **Ammophila mandibulata**, *Kirby, Trans. Linn. Soc.* v, p. 134, pl. xiv, fig. 18.

♀. Head, thorax, and abdomen smooth and shining; the head, pro- and mesonotum, scutellum, and postscutellum with a few very fine scattered punctures; median segment delicately transversely striate; abdomen long, polished and impunctate; mandibles

remarkably long and powerful; clypeus convex, arcuate anteriorly; the head, the pronotum in front, and the sides of the median segment slightly pubescent. Intensely black; wings fuscous with a slight purple effulgence, the hind wing a little paler; pubescence black.

Hab. Beluchistan, Afghanistan. ♀. *Length* 21; *exp.* 28 mm. ♂ unknown. Type in the British Museum.

444. **Ammophila erythrocephala.**

Sphex erythrocephala, *Fabr. Ent. Syst.* p. 204.
Pelopœus erythrocephalus, *Fabr. Syst. Piez.* p. 203.
Ammophila erythrocephala, *Lepel. Hym.* iii, p. 385; *Smith, Cat.* iv, p. 216; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, pp. 94 & 100.
? Ammophila violaceipennis, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, pp. 94 & 100, ♂.

♀. Head, pronotum, legs, and abdomen smooth and shining: mesonotum finely reticulate, scutellum and postscutellum longitudinally striate; median segment coarsely reticulate above along the middle, and transversely striate on the sides; clypeus broader than high, slightly convex, its anterior margin transverse in the middle, oblique at the sides; eyes parallel. Black, the head, the pronotum, legs, and petiole of the abdomen red; the abdomen blue-black; the apical half of the flagellum of the antennæ black, the scape and basal half red; the coxæ, trochanters, and apical joint of the tarsi fuscous; wings fuscous with a purple effulgence.

♂. The head from fuscous red to black, the clypeus projecting a little, the eyes convergent below (var. *violaceipennis*, Cam.).

Hab. Throughout India except in the extreme South and South-west (Malabar). ♀. *Length* 32–34; *exp.* 50–52 mm. ♂. *Length* 29–31; *exp.* 48–51 mm.

Genus SCELIPHRON.

Sceliphron, *Klug, Neue Schrift. d. Ges. naturf. Freunde zu Berl.* iii, p. 555 (1801).
Pelopœus, *Latr. Hist. Nat. Ins.* xiii, p. 294 (1804).
Pepsis, pt., *Illig. Ed. Faun. Etrusc.* ii, p. 94 (1807).
Chalybion, *Dahlb. Hym. Eur.* i, p. 21 (1845).

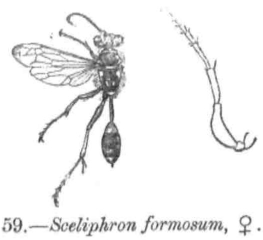

Fig. 59.—*Sceliphron formosum*, ♀. 1/1.

Type, *S. spirifex*, Linn.

Range. Over both hemispheres.

In the fore wing the 2nd cubital cell receives both recurrent nervures, and is narrowed at the top by the convergence of the 1st

and 2nd transverse cubital nervures; the 3rd cubital cell also much narrowed at the top by the curving inwards towards the base of the cell of the 3rd transverse cubital nervure. Fore tarsi not ciliated. Abdomen with a long, slender, 1-jointed petiole, the remaining segments together abruptly widened, ovate, acute at apex. The ♀ makes earthen cells and stores them with spiders.

Key to the Species.

A. Colours black and yellow.
  a. Mesonotum striate.
    a'. Median segment with a medial longitudinal broad furrow.
      a². Comparatively large (length 27–30 mm.).
        a³. Extreme apex of femora and apical half of tibiæ of posterior legs black .... *S. intrudens*, p. 236.
        b³. Femora and tibiæ of posterior legs entirely yellow .... *S. spinolæ*, p. 237.
      b². Comparatively small (length 16–18 mm.). Apical two-thirds of femora and of tibiæ of posterior legs black .. *S. madraspatanum*, [p. 237.
    b'. Median segment without a broad medial longitudinal furrow.
      a². Median segment black .... *S. coromandelicum*, [p. 238.
      b². Median segment variegated with yellow.
        a³. Tibiæ of the posterior legs yellow .. *S. solieri*, p. 238.
        b³. Tibiæ of the posterior legs black .. *S. bilineatum*, p. 239.
  b. Mesonotum punctured, not striate .... *S. javanum*, p. 239.
B. Colours chestnut-brown and yellow .... *S. formosum*, p. 239.
C. Colour dark shining cobalt-blue, with glistening silvery pubescence .... *S. violaceum*, p. 240.

445. **Sceliphron intrudens.**

Pelopœus intrudens, *Smith, Jour. Linn. Soc.* 1859, p. 15, ♀.

♀. Head and thorax pubescent, clypeus and the face in front densely pruinose; head, pro- and mesonotum finely and very closely punctured, the punctures running into indistinct striæ on the last; scutellum and postscutellum longitudinally, the enclosed raised space at the base of the median segment transversely, and the sides and apex of the same obliquely striate; a medial longitudinal broad furrow on the raised space on the median segment; the petiole and basal two segments of the abdomen smooth and shining, the rest of the segments with minute longitudinal striæ. Black, with black pubescence; the clypeus and front with silvery pile, the apex of the femora, the tibiæ and basal joint of the tarsi of the anterior and intermediate legs, the trochanters,

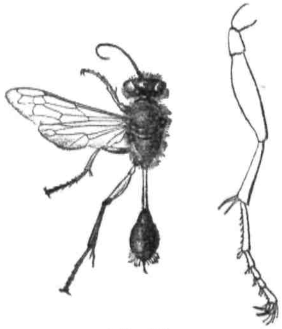

Fig. 60.
Sceliphron intrudens, ♀. 1/1.

femora except at apex, base of the tibiæ, basal joint of the tarsi of the posterior legs, and petiole of abdomen yellow; wings light flavo-hyaline.

♂ similar.

Var. The posterior tibiæ and tarsi entirely black.

Hab. Sikhim; Burma; Tenasserim; Celebes. ♀ ♂. *Length* 27–30; *exp.* 43–45 mm.

446. **Sceliphron spinolæ.**

Pelopœus spinolæ, *Lepel. Hym.* iii, p. 307, ♀; *Smith, Cat.* iv, p. 231; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 102.

♀. Head and thorax pubescent; the head finely but not very closely punctured, the mesonotum finely obliquely striate, scutellum and postscutellum longitudinally striate; median segment long, the enclosed space at the base raised, obliquely striate, with a broad furrow down the middle, the sides of the median segment obliquely striate; petiole and succeeding segment of the abdomen smooth, the rest of the segments with minute longitudinal striæ. Black, with black pubescence; the apex of the femora, the tibiæ, and basal two or three joints of the tarsi of the anterior and intermediate legs reddish yellow; the trochanters, femora, tibiæ, basal two or three joints of the tarsi of the posterior legs, and the petiole of the abdomen clear straw-yellow; the apical joints of the tarsi fuscous brown or black; wings deep flavo-hyaline at base, clearer towards the apex.

♂ similar, with a longer petiole.

Hab. Ceylon; Southern India; Bombay; Bengal. ♀ ♂. *Length* 27–30; *exp.* 40–44 mm.

447. **Sceliphron madraspatanum.** (Pl. I, fig. 7.)

Sphex madraspatanus, *Fabr. Ent. Syst.* ii, p. 204.

Pelopœus madraspatanus, *Fabr. Syst. Piez.* p. 203; *Smith, Cat.* iv, p. 231; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 102.

Pelopœus separatus, *Smith, A. M. N. H.* (2) ix, 1852, p. 47.

♀. Head finely and closely punctured; pronotum in front, mesonotum, and median segment finely and transversely, and scutellum and postscutellum longitudinally striate, the pronotum bituberculate and smooth posteriorly; median segment with the enclosed portion at base raised and bearing a broad shallow medial longitudinal furrow; petiole and abdomen smooth. Black, the clypeus and sides of the face in front covered with a short fine silvery pile; a spot on the apex of the scape of the antennæ, a line on the pronotum (often absent), a spot on the tegulæ, another on the postscutellum, the apex of the femora and the tibiæ of the anterior four legs, the trochanters, bases of the femora and of the tibiæ of the posterior legs, and the petiole of the abdomen, yellow; wings hyaline and iridescent, with a brownish tint.

♂ similar but slighter, with comparatively a longer petiole.

Var. The scutellum and postscutellum both yellow.

Hab. Throughout India, Burma, Tenasserim, and Ceylon. ♀. *Length* 20–22; *exp.* 28 mm. ♂. *Length* 16–18; *exp.* 24–27 mm.

448. Sceliphron coromandelicum.

Pelopœus coromandelicus, *Lepel. Hym.* iii, p. 306, ♀; *Smith, Cat.* iv, p. 231; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 101.
? Pelopœus fuscus, *Lepel. Hym.* iii, p. 311.

♀. Head and thorax pubescent, head with a few very fine punctures; the clypeus, sides of the face, and behind the eyes pilose; thorax very finely transversely striate, the posterior margin of the pronotum and the scutellum smooth, the latter with indications of fine divergent longitudinal striæ; median segment rounded above, posteriorly steeply sloped, the sides above with well-marked furrows which unite posteriorly and are continued as one furrow almost to the apex of the median segment; petiole and abdomen smooth. Black with black pubescence, the pile on the face and cheeks silvery; the basal joints 2–4 of the flagellum of the antennæ and the scape beneath yellowish, in some specimens entirely black; the posterior margin of the pronotum, the apical two-thirds of the femora, the tibiæ and tarsi of the four anterior legs, and the whole of the femora, the tibiæ and tarsi of the posterior pair, with the petiole of the abdomen, ferruginous yellow; wings light flavo-hyaline, fuscescent at apex; nervures light brown; tegulæ and a spot below them yellow.

♂ similar, with a longer petiole.

Hab. Bombay; Central and Southern India; Burma. ♀ ♂. *Length* 19–21; *exp.* 32–34 mm.

***449. Sceliphron solieri.**

Pelopœus solieri, *Lepel. Hym.* iii, p. 318, ♀; *Smith, Cat.* iv, p. 231; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 102.

♀. "Head black, veiled in front with black pubescence over silvery pile; antennæ black, the first joint yellow. Prothorax black with a yellow fascia above. Mesothorax black; a fascia under the wings yellow. Metathorax black, canaliculated on both sides above and with a large yellow spot posteriorly. The scutellum and postscutellum with a yellow fascia. Thorax covered all over with black pubescence. Abdomen with the petiole black, the first segment bearing on the dilated apical portion a yellow bar. Anal segment with black pubescence. Legs—the four anterior yellow, the coxæ, trochanters, and base of the femora black; the two posterior legs black, the tibiæ and base of the tarsi yellow. Wings rufo-fuscous, the apex darker; the nervures, the stigma, and tubercules fusco-ferruginous; the tegulæ yellow."

Hab. India (*Smith*); Guadeloupe! (*Lepel.*). ♀. *Length* 10 lines (21 mm.).

Unknown to me, but closely allied apparently to *S. bilineatum*, Smith, from which, so far as the description goes, it differs in the colour of the wings and in having a black petiole to the abdomen.

450. Sceliphron bilineatum.

Pelopœus bilineatus, *Smith, A. M. N. H.* (2) ix, 1852, p. 47; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 101.
? Pelopœus pictus, *Smith, Cat.* iv, p. 231.

♀. Head very finely and closely punctured; front and clypeus densely pruinose, the former slightly concave, the latter flat, produced anteriorly into two blunt teeth in the middle; pronotum anteriorly, mesonotum and median segment finely transversely striate; the posterior margin of the pronotum, scutellum, postscutellum, the legs, and the abdomen smooth and shining, the apical five segments of the last slightly pruinose. Black; a spot on the middle of the clypeus, the scape and basal four joints of the flagellum of the antennæ below, the posterior margin of the pronotum, the tegulæ, a line beneath the wings, the scutellum and postscutellum in the middle, two large spots laterally at the base, and the apical two-thirds of the median segment, the greater part of the femora, the tibiæ and basal three joints of the tarsi of the anterior and intermediate legs, the greater part of the femora and basal two joints of the tarsi of the posterior legs, and the petiole, with a large spot above on the succeeding segment of the abdomen, yellow; the black on the median segment produced back in a narrow line almost to the apex of the segment; apical joints of the tarsi reddish; clypeus and front with dense silvery pile; wings flavo-hyaline, nervures yellow, the apex of the wings lightly fuscescent.

♂ similar, with a longer petiole.

Var. The yellow on the posterior portion of the median segment reduced to two broad lines.

Hab. Western India. ♀ ♂. *Length* 16–19; *exp.* 30–33 mm.

451. Sceliphron javanum.

Pelopœus javanus, *Lepel. Hym.* iii, p. 309, ♀; *Smith, Cat.* iv, p. 231; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 101.

♀. Head, pro- and mesonotum very finely and closely punctured; scutellum and abdomen finely longitudinally striate, the striæ on the latter exceedingly fine and minute; median segment rounded above posteriorly, abruptly sloped to the apex, transversely striate, with a medial longitudinal furrow ending at the margin of the steep slope; head and thorax pubescent. Black, with black pubescence; the anterior four legs yellowish ferruginous, with the coxæ, trochanters, and base of the femora black; the posterior two black, with the trochanters and the basal half of the femora yellow; the petiole of the abdomen yellow; wings fulvo- or rufo-hyaline, the nervures testaceous, the tegulæ black.

♂ similar, with a comparatively longer petiole.

Hab. Sikhim; Burma; Ceylon; Java. ♀ ♂. *Length* 30–36; *exp.* 46–50 mm.

452. Sceliphron formosum.

Pelopœus formosus, *Smith, Cat.* iv, p. 230, ♀.
Pelopœus deformis, *Smith, Cat.* iv, p. 231, ♀.
Pelopœus curvatus, *Smith, Trans. Zool. Soc.* vii, p. 187, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 101.

♀. Head punctured on the front and vertex, densely pruinose

on the clypeus and sides of the face; pronotum smooth in front, its posterior margin notched; mesonotum and median segment finely transversely striate, both with a medial longitudinally impressed line; scutellum and postscutellum smooth, with indications of longitudinal striæ; the apex and sides of the median segment with soft sparse pubescence; abdomen smooth. The typical form of this insect is black, marked with yellow, and is Australian; but the form found within our limits is dark chestnut-brown; a spot on the clypeus, the front of the scape of the antennæ, the posterior margin of the pronotum, a spot on the front of the tegulæ, the tubercles, a short oblique stripe beneath them, a transverse spot pointed at each end on the scutellum, a spot on each side on the median segment at the margin of the steep subapical slope, and the apex, yellow; the legs reddish chestnut, shaded with fuscous black; abdomen with the apical margins of segments 4–6 yellow; wings light flavo-hyaline, nervures and tegulæ testaceous yellow, the apex of the wings fuscescent.

Var. The median segment without the subapical spots, sometimes also without the basal spots.

Hab. Australia; China; Sikhim; North-West Provinces of India; Burma; Tenasserim. ♀ ♂. *Length* 18–21; *exp.* 28–30 mm.

453. **Sceliphron violaceum.** (Pl. I, fig. 8.)

Sphex violacea, *Fabr. Ent. Syst.* ii, p. 201.
Pepsis violacea, *Fabr. Syst. Piez.* p. 211.
Chalybion violaceum, *Dahlb. Hym. Eur.* i, p. 21.
Chalybion bengalensis, *Dahlb. Hym. Eur.* i, p. 433.
Pelopœus violaceus, *Lepel. Hym.* iii, p. 321.
Pelopœus flebelis, *Lepel. Hym.* iii, p. 321.
Pelopœus bengalensis, *Smith, Cat.* iv, p. 230; *Horne, Trans. Zool. Soc.* vii, p. 163, pl. xxi, figs. 2, 2 *a*.

♀. Head punctured; the clypeus, front of the face, and cheeks behind the eyes densely pubescent, a short perpendicular carina on the front between the antennæ; thorax slightly pubescent, shining; the pro- and mesonotum closely punctured; the punctures on the latter, in some specimens, running into transverse striæ, the former bituberculate; the median segment long, convex, transversely striate in some, and only closely punctured in other specimens, the sides above with more or less of a broad shallow longitudinal furrow; petiole and abdomen brilliantly polished, smooth and shining. Deep glistening cobalt-blue, the pubescence silvery white, the apical ten joints of the flagellum of the antennæ and the tarsi opaque black; wings hyaline, and from merely fuscescent along the apical margin to dark fusco-violaceous on the apical half or two-thirds.

♂ similar, but slighter, with a longer petiole.

Hab. Southern and Eastern Europe; Northern Africa; India; Burma; Tenasserim; Ceylon; China; Japan; and the Malayan and Australian subregions to Java and the Philippines. ♀. *Length* 15–19; *exp.* 26–32 mm. ♂. *Length* 11–16; *exp.* 22–28 mm.

Genus SPHEX.

Sphex, pt., *Linn. Syst. Nat.* ed. xii, p. 941 (1767).
Dryinus, pt.; Pepsis, pt.; Chlorion, *Fabr. Syst. Piez.* pp. 200, 207, 217 (1804).
Pronœus, *Latr. Gen. Crust. Ins.* iv, p. 56 (1809).
Enodia, Priononyx, *Dahlb. Hym. Eur.* i, p. 28 (1845).
Harpactopus, Parasphex, *Smith, Cat.* iv, pp. 264, 267 (1856).
Gastrosphæria, *Costa, Faun. Regn. Nap.* p. 10 (1858).
Pseudosphex, *Taschenberg, Zeitschr. ges. Naturwiss. Halle*, xxxiv p. 420 (1869).
Isodontia, *Patton, Proc. Boston Soc. Nat. Hist.* xx, p. 380 (1881).
Sphex, *Kohl, Ann. Naturhist. Hofmus. Wien*, v, 1890, p. 105.

Fig. 61.—*Sphex umbrosus*, ♀. $\frac{1}{1}$.

Type, *S. flavipennis*, Fabr.

Range. Over both hemispheres.

The 2nd cubital cell receives the 1st, and the 3rd cubital cell the 2nd recurrent nervure. Legs stout, furnished with spines; the anterior tarsi strongly ciliated on the outside.

The Oriental species of this genus make burrows in the ground, storing their nests with various species of orthopterous insects.

Key to the Species.

A. Tarsal claws unidentate.
  a. Head, thorax, and abdomen some shade of metallic blue or green .... *S. lobatus*, p. 242.
  b. Head and thorax red.
    a'. Only the pro- and mesothorax red ...... *S. regalis*, p. 243.
    b'. The whole thorax including the median segment red .... *S. splendidus*, p. 243.

B. Tarsal claws bidentate.
  a. Scutellum and postscutellum longitudinally notched.
    a'. Wings flavo-hyaline .... *S. luteipennis*, p. 247.
    b'. Wings clear hyaline.
      a^2. Legs and abdomen black .... *S. umbrosus*, p. 250.
      b^2. Legs and abdomen red .... *S. vicinus*, p. 245.
    c'. Wings hyaline and iridescent, with a brownish tint.
      a^2. Pubescence on thorax ferruginous ... *S. aurulentus*, p. 250.

b^2. Pubescence on thorax white.
a^3. Abdomen red, marked with black .. *S. aurulentus* (var. *lineolus*), p. 251.
b^3. Abdomen wholly black.......... .. *S. nigellus*, p. 249.
d'. Wings dark fuscous with a purple effulgence............................ *S. maurus*, p. 247.
b. Postscutellum not notched.
a'. Wings flavo-hyaline.
a^2. Median segment posteriorly concavo-truncate........................ *S. ægyptius*, p. 245.
b^2. Median segment posteriorly rounded .. *S. nigripes*, p. 248.
b'. Wings clear hyaline .... *S. nivosus*, p. 244.
c'. Wings dark fuscous .... *S. nigripes* (var. *siamensis*), p. 248.
c. Scutellum not notched; postscutellum notched............................ *S. fulvo-hirtus*, [p. 244.
d. Both scutellum and postscutellum without notch.
a'. Wings flavo-hyaline.
a^2. Pubescence on front of head and on thorax golden .... *S. aurifrons*, p. 247.
b^2. Pubescence on front of head and on thorax silvery .... *S. xanthopterus*, [p. 246.
b'. Wings hyaline, with a dark apical fuscous spot on fore wing .... *S. maia*, p. 249
c'. Wings hyaline, shaded with brownish fuscous and with iridescent purple effulgence............................ *S. edax*, p. 25
d'. Wings dark fuscous .... *S. morosus*, p. 246

C. Tarsal claws tridentate.................... *S. viduatus*, p. 252.

(GROUP I. *Claws unidentate.*)

454. **Sphex lobatus**, *Fabr. Syst. Ent.* p. 348; *Kohl, Ann. Naturhist. Hofmus. Wien*, v, 1890, p. 177.
Sphex smaragdinus, *Drury, Ill. Exot. Ins.* iii, p. 57, pl. 42, fig. 2.
Sphex cœrulea, *Christ*, (*nec Drury*), *Naturg. Ins.* p. 308.

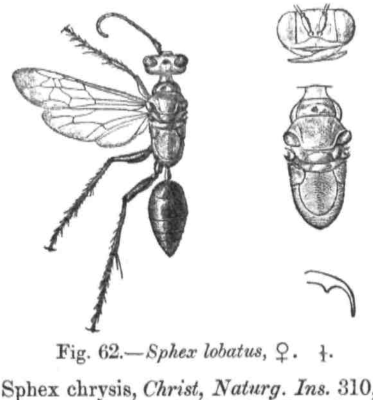

Fig. 63.
Sphex lobatus, ♂, head.

Fig. 62.—*Sphex lobatus*, ♀. ⅟.

Sphex chrysis, *Christ, Naturg. Ins.* 310, pl. xxx, fig. 7.
Chlorion lobatum, *Fabr. Ent. Syst.* ii, p. 206; *Smith, Cat.* iv, p. 237
Chlorion azureum, *Lepel. et Serv. Encycl. Méth.* x, p. 451.

♀. Head, thorax, and abdomen brilliantly polished, smooth and shining; the head and thorax with a very few, scattered, shallow punctures; clypeus transverse, very much broader than high, convex in the middle, its anterior margin waved and emarginate; the median segment long, cylindrical, not much sloped posteriorly but roundly truncate, everywhere strongly and evenly transversely striate; legs long, slender, the tibiæ and tarsi spinose, the spines long; abdomen petiolate, the petiole short, about the length of the basal segment. Of a brilliant blue-green, the antennæ, the tibiæ below, and the tarsi opaque black; the clypeus and sides of the face with silvery pile.

♂ similar, smaller, more slender; the clypeus triangular, not transverse, convex in the middle, its anterior margin with a rounded arch. Wings in both sexes hyaline, slightly flavescent, in certain lights iridescent, the apical margin lightly fuscous; nervures brown, tegulæ brilliant purplish blue.

Hab. Throughout India, Burma, Tenasserim, Ceylon, extending to China and the Malayan region to the East, and to Africa to the West. ♀. *Length* 24–32; *exp.* 52–58 mm. ♂. *Length* 15–26; *exp.* 28–38 mm.

455. **Sphex regalis.**

Chlorion regalis, *Smith, A. M. N. H.* (4) xii, 1873, p. 291.
Sphex regalis, *Kohl, Ann. Naturhist. Hofmus. Wien*, v, 1890, p. 179, ♀ ♂.

♀. Head broad, broader than the thorax, somewhat square above, opaque; the face on each side of the base of the antennæ sulcate, and a vertically impressed line before and behind the anterior ocellus; pronotum bituberculate; median segment long, posteriorly roundly truncate, transversely striate; abdomen polished and shining. Head, thorax in front, femora, tibiæ and tarsi of the legs dull brick-red, the tarsi somewhat fuscous; median segment, coxæ, trochanters, and the abdomen brilliant effulgent purple; wings dark brown, with a purple effulgence, fore wing broadly fuscous at apex, the apex and posterior margin of the hind wing clear hyaline.

Hab. Karáchi, Sind, extending into Afghanistan and the Transcaspian regions, and in Africa to the Soudan. ♀. *Length* 26–34; *exp.* 48–50 mm. ♂. *Length* 24–28; *exp.* 42–46 mm.

456. **Sphex splendidus.** (Pl. I, fig. 9.)

Chlorion splendidum, *Fabr. Syst. Piez.* p. 218; *Smith, Cat.* iv, p. 238.
Pronœus campbelli, *Saund. Trans. Ent. Soc.* iii, 1841, p. 58, pl. 5, fig. 1.
Sphex pulchra, *Lepel. Hym.* iii, p. 355, ♂.
Chlorion melanosoma, *Smith, Cat.* iv, p. 238, ♀.
Sphex splendidus, *Kohl, Ann. Naturhist. Hofmus. Wien*, v, 1890, p. 181.

♀. Head, thorax, and abdomen smooth and shining; the

abdomen with a brilliant polish, the head and thorax with a very few nearly obsolete shallow punctures; head large, much broader than the thorax: the clypeus vertically very narrow, transverse, slightly convex in the middle; the base of the antennæ planted in a deep hollow above the clypeus, above which the front is somewhat closely punctured and studded with some scattered long hairs; pronotum deeply notched in the middle; median segment long, with very little slope posteriorly, the apex roundly truncate, everywhere closely transversely striate; legs long, the tibiæ and tarsi spinose, the spines short and stout; abdomen petiolate, the petiole short. Head, thorax, and legs dull brick-red, the median segment above with a brilliant golden coppery lustre, the space round the ocelli black; the abdomen brilliant purplish blue, the petiole slightly reddish; wings reddish yellow, the apex of the fore and apex and posterior margin of the hind wing broadly fuscous with a purple effulgence.

♂ similar, but smaller and slighter, the clypeus triangular.

Var. *melanosoma*, Smith, is similar in sculpture, but has only the clypeus, the mandibles, the scape, and four or five of the basal joints of the flagellum of the antennæ red, or the insect may be wholly black; the wings are also a lighter and brighter yellow.

Hab. Northern and Western India, extending into Afghanistan, Burma, and Tenasserim in the East. ♀. *Length* 24–30; *exp.* 45–48 mm. ♂. *Length* 18–24; *exp.* 40–46 mm.

(GROUP II. *Claws bidentate.*)

457. **Sphex fulvo-hirtus,** *Bingh. Jour. Bomb. N. H. Soc.* v, 1890, p. 242, ♀; *id.* viii, 1893, p. 379, pl. i, fig. 8, ♀.

♀ ♂. Head pruinose and pubescent anteriorly; vertex and thorax in front very closely and finely punctured; median segment long, roundly truncate posteriorly, and densely pubescent; abdomen smooth, opaque; scutellum prominent, with a slight shallow longitudinal furrow; postscutellum bituberculate. Black, with black pubescence; the clypeus, face at the sides, and pronotum anteriorly, with silvery pile; median segment above with long, thick, yellow pubescence: wings flavo-hyaline, paler along the apical margins; nervures testaceous, tegulæ black.

Hab. Ceylon; Loo Choo Islands. ♀. *Length* 27; *exp.* 54 mm. ♂. *Length* 25; *exp.* 48 mm.

458. **Sphex nivosus.**

Harpactopus nivosus, *Smith. Cat.* iv, p. 265, ♀.
Sphex nivosa, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 106.

♀. Head, thorax, legs, petiole, and basal segment of abdomen densely pilose, second and following segments of the abdomen smooth and shining; clypeus broad, very slightly convex, anterior

margin transverse in the middle, oblique, slightly arched at the sides; front with a vertically impressed line; median segment long, roundly truncate posteriorly, and rather coarsely transversely striate under the thick pile. Light ferruginous or brownish red; the apex of the mandibles remarkably long, acute, and black; flagellum of antennæ black; abdomen with the apical margins of the 2nd and following segments sordid testaceous white; the head, the thorax, legs, especially the coxæ and trochanters, the petiole, and the basal segment of the abdomen with dense glittering, rather long silvery pubescence; wings clear hyaline.

Hab. Northern India. ♀. *Length* 29 ; *exp.* 43 mm.

Kohl (*l. c.*) unites this species with *Sphex nigropectinatus*, Taschenbg., but the type and only specimen in the British Museum collection does not agree with Taschenberg's description of his species.

459. **Sphex ægyptius,** *Lepel. Hym.* iii, p. 356; *Kohl, Ann. Naturhist. Hofmus. Wien,* v, 1890, p. 351, ♀ ♂.
Sphex soror, *Dahlb. Hym. Eur.* i, p. 436.
Harpactopus crudelis, *Smith, Cat.* iv, p. 264. pl. vi, fig. 4.
Sphex grandis, *Radoszk. Hor. Soc. Ent. Ross.* xii (1876), p. 132.

♀. Head densely pilose, with scattered pubescence; mesonotum punctured; median segment long, cylindrical, transversely striate, with thick long pubescence, its apex posteriorly concavely truncate; legs stout, long, thickly spinose; abdomen smooth and shining; clypeus boldly convex, its anterior margin transverse, depressed, and notched in the middle. Black, with black pubescence, the front of the head and face with dense silvery pile; wings flavo-hyaline, broadly pale, clear hyaline along the apical margin of fore and apical and posterior margin of hind wing.

♂ similar but smaller, with the clypeus bilobed.

Hab. Syria; Arabia; Egypt; Abyssinia; Mauritius; Southern India, Madras. ♀. *Length* 26–34 ; *exp.* 48–52 mm. ♂. *Length* 22–28 ; *exp.* 42–44 mm.

460. **Sphex vicinus,** *Lepel. Hym.* iii, p. 343, ♀; *Smith, Cat.* iv, p. 253; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 108; *Kohl, Ann. Naturhist. Hofmus. Wien,* v, 1890, p. 454.
Sphex rothneyi, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, pp. 108 & 112.

♀. Head, thorax, and the petiole of the abdomen densely pruinose, rest of the abdomen smooth and shining; clypeus broad, convex, with an indistinct medial vertical carina, the anterior margin rounded; pronotum not furrowed; scutellum and postscutellum with slight indications of a medial depression; median segment with coarse broad transverse striæ; legs long and spinose; petiole of abdomen short. Head, thorax, coxæ, and trochanters

of the legs black; the femora, tibiæ, base of the tarsi of the legs, and the abdomen red; the clypeus, the face in front, and the sides of the mesonotum covered with a dense silvery pile; the median segment at apex and on the sides with longish, soft, white pubescence: wings hyaline, slightly iridescent, their apex lightly fuscescent; nervures and tegulæ testaceous red. Varieties have the abdomen above and below variegated with black.

Hab. Mussooree. ♀. *Length* 18–22; *exp.* 35–40 mm.

461. **Sphex xanthopterus,** *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, pp. 109 & 113; *Kohl, Ann. Naturhist. Hofmus. Wien*, v, 1890, p. 389, ♀ ♂.

♀. Head, thorax, and abdomen densely pruinose; clypeus convex, higher than broad, its anterior margin rounded; the front sulcate above the antennæ; eyes divergent above; pronotum, scutellum, and postscutellum entire, without any longitudinal sulca; median segment longish, opaque, with a gentle slope posteriorly to the apex, which is rounded; legs long, smooth, the tibiæ and tarsi with fine spines; petiole short; abdomen fusiform above, finely aciculate. Black, with a dense but short silky silvery pile; the clypeus, the front, and the sides and apex of the median segment with a rather sparse long silvery pubescence; the pile in certain lights has a golden yellow lustre; wings light flavo-hyaline, apex broadly fuscescent; nervures yellow, tegulæ black.

Hab. Northern India, Barrackpore, Bengal; Tranquebar; Africa; Zanzibar. ♀ ♂. *Length* 15–18; *exp.* 32–36 mm.

462. **Sphex morosus,** *Smith, Jour. Linn. Soc.* 1861, p. 122, ♂; *Kohl, Ann. Naturhist. Hofmus. Wien*, v, 1890, p. 448.

♂. Head and thorax in front finely and closely punctured and pubescent; the clypeus and front of the face pilose; the median segment finely rugulose; petiole of abdomen long, slightly curved upwards; abdomen short, broad, subfusiform; clypeus convex, its anterior margin very slightly arched, nearly transverse; pronotum entire, not indented; mesonotum with a central longitudinally impressed line anteriorly; median segment with a gentle rounded slope posteriorly, except at the apex, where it is suddenly steep; legs long, tibiæ and tarsi feebly spinose; abdomen very indistinctly aciculate above. Black, with black pubescence, the clypeus and the face in front with dense silvery pile; wings fuscous brown with a coppery effulgence, the hind wing much lighter and paler. A variety has the posterior femora below and the inside of the posterior tibiæ red.

Hab. Sikhim; Burma; Tenasserim; and the Malay region to Celebes. ♂. *Length* 21–23; *exp.* 34–37 mm. Female unknown.

463. **Sphex maurus,** *Smith, Cat.* iv, p. 255, ♀ ♂; *Kohl, Ann. Naturhist Hofmus. Wien,* v, 1890, p. 411, ♀ ♂.
Sphex tyrannica, *Bingh.* (*nec Smith*) *Jour. Bomb. N. H. Soc.* v 1890, p. 241.

♀ ♂. Head and thorax in front pruinose, and sparsely pubescent; median segment lightly transversely rugulose; abdomen smooth and shining, very finely longitudinally aciculate; clypeus vertically oval, convex, sparsely punctured; a vertically impressed line on the front from between the base of the antennæ to the anterior ocellus; back of the head emarginate; pronotum flat above, slightly indented in the middle; scutellum, postscutellum, and median segment furrowed down the middle; the median segment steeply rounded at apex, almost truncate, the median furrow not reaching the edge of the truncation, but broadening out in spoon-shaped form just before the margin; legs stout, the tibiæ and tarsi spinose; petiole of abdomen short; abdomen broadly subfusiform. Black, with black pubescence: the wings dark fuscous, with a rich purple effulgence; nervures and tegulæ black.

Hab. Burma, Tenasserim, and the Malayan region as far as Celebes. ♀. *Length* 28–34; *exp.* 50–58 mm. ♂. *Length* 25–28; *exp.* 48–52 mm.

464. **Sphex aurifrons,** *Smith, Jour. Linn. Soc.* 1859, p. 157; *Kohl, Ann. Naturhist. Hofmus. Wien,* v, 1890, p. 439.

♀ ♂. Closely resembles *S. nigripes,* Smith, but is a slighter, more graceful insect; the clypeus is not so convex, and has its anterior margin waved, not arched, with two short blunt teeth in the midlde; the head and thorax in front finely and closely punctured; the pronotum with its posterior margin entire, not longitudinally sulcate; the median segment not abruptly truncate or steeply sloped at apex, finely rugulose and covered with a soft thin pubescence; legs long, rather sparsely spinose; petiole of abdomen rather longer than in *S. nigripes*; abdomen finely aciculate. Black, the clypeus and sides of the face with a short dense rich golden pile and scattered long fulvous hairs; the pubescence on the thorax fulvous red; legs with the femora, tibiæ, and basal four joints of the tarsi red; abdomen black, with the apical margins of the segments above and below broadly testaceous brown; wings light flavo-hyaline, the apical margins paler; nervures and tegulæ testaceous. Varies in having the abdomen also covered with a thin short fulvous pile.

Hab. Sikhim; Aru Islands. ♀. *Length* 21–24; *exp.* 34–40 mm. ♂ slightly smaller.

465. **Sphex luteipennis,** *Mocs. Magyar Akad. Ert. Term.* Kör. xiii (1883), sz. 11, p. 33, ♀; *Kohl, Ann. Naturhist. Hofmus. Wien,* v, 1890, p. 423.
Sphex rufipennis, *Kohl* (*nec Fabr.*), *Term. Füzetek.* ix (1885), p. 198, ♀ ♂.

♀. Head and thorax in front finely and rather sparsely

punctured; median segment transversely finely rugulose; abdomen smooth, somewhat aciculate above; clypeus cone-shaped, its anterior margin arched, narrowly smooth and porrect, studded above with coarse punctures and rather stiff hairs; a deeply impressed line on the front above the base of the antennæ to the ocelli, dividing at the anterior ocellus into two and reaching the vertex; pronotum entire, not longitudinally sulcate; median segment roundly truncate posteriorly; legs stout, the tibiæ and tarsi spinose; petiole short; abdomen widely fusiform, slightly vertically compressed. Intensely black, with black pubescence on the front and median segment; the sides of the face and the clypeus in certain lights with silvery pile; wings light oily yellow, broadly fuscous along the apical margin; nervures testaceous, tegulæ black.

♂ similar, but the clypeus is longer, more convex, with its anterior margin not so arched and not porrect; the antennæ and petiole of abdomen are longer, and the wings of a more fuscous yellow.

Hab. Sikhim; Bengal; Assam; Burma; and, according to Kohl, Egypt, Zanzibar, Ceylon, and Amboina. ♀. *Length* 25–32; *exp.* 50–54 mm. ♂. *Length* 22–28; *exp.* 44–50 mm.

466. **Sphex nigripes**, *Smith, Cat.* iv, p. 254, ♀; *Kohl, Ann. Naturhist. Hofmus. Wien*, v, 1890, p. 421.

Sphex siamensis, *Taschb. Zeitschr. ges. Naturwiss. Halle*, xxxiv, p. 413, ♀.

Sphex erythropoda, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, pp. 108 & 110.

♀. Head and thorax pruinose; abdomen smooth, finely aciculate; clypeus cone-shaped, convex, the centre distinctly raised, its anterior margin arched, narrowly smooth and porrect; pronotum entire, not divided by a longitudinal sulcation; scutellum and postscutellum prominent, with just an indication of a central longitudinal division; median segment finely transversely rugulose, with a steep slope at apex and a well-marked central longitudinal groove, covered with a fine velvety pubescence; legs stout, rather long, the tibiæ and tarsi spinose; petiole of abdomen short; abdomen broadly subfusiform. Opaque black; the sides of the face and the clypeus with a dense silvery pile having a golden tinge in certain lights; the pubescence on the head and median segment black; legs black, the posterior femora and tibiæ red; wings flavo-hyaline, with the apical margin broadly fuscous.

♂ similar, but smaller, with the wings darker; the clypeus longer, and having its anterior margin very slightly arched, almost truncate.

This species is very variable so far as the colour of the wings and legs is concerned. The wings in certain specimens are dark fuscous with a brilliant purple effulgence, and have very little of the yellow tinge on the disc. The femora and tibiæ of all the legs, or of the intermediate and posterior pair, or of the posterior pair only, may be wholly or partially red.

Hab. In the Palæarctic region this species is found in Chifu, China; in the Ethiopian region in Ashanti; and in the Oriental in India, Burma, Ceylon, Sumatra, Java. ♀. *Length* 24–30; *exp.* 46–50 mm. ♂. *Length* 22–25; *exp.* 40–44 mm.

467. **Sphex maia,** *Bingh. Jour. Bomb. N. H. Soc.* viii, p. 379, ♀ ♂.

♀. Head and thorax pruinose, abdomen smooth; clypeus long, slightly convex, distinctly carinate down the middle, its anterior margin waved, transverse; eyes parallel, inner orbits outwardly arched; occiput transverse, mesonotum indented in the middle anteriorly, postscutellum not indented; median segment rugulose; legs stout, pruinose, the tibiæ smooth, the tarsi with fine short spinose hairs; petiole long, curved, rest of the abdomen short, broad, somewhat vertically compressed. Black; the clypeus and sides of the face with dense silvery pile; the thorax with soft scattered greyish pubescence, the inside of the posterior tibiæ with fine silky ferruginous pile; the 2nd segment of the abdomen red; the succeeding segments narrowly margined with testaceous; wings hyaline, slightly iridescent, the extreme apex of the fore wing fuscous, nervures testaceous, tegulæ black.

♂ similar, but with the petiole longer and the wings broader.

Hab. Sikhim; Bengal; Burma; Tenasserim. ♀. *Length* 16–18; *exp.* 26–28 mm. ♂. *Length* 16–17; *exp.* 29–30 mm.

This species is closely allied to *S. splendidulus*, A. Costa, but differs in the form of the clypeus and sculpture of the thorax.

468. **Sphex nigellus,** *Smith, Cat.* iv, p. 255, ♀ ♂; *Kohl, Ann. Naturhist. Hofmus. Wien*, v, 1890, p. 379, ♀ ♂.

♀ ♂. Head and thorax in front smooth, with scattered punctures; the clypeus and front of the face with dense close pile and scattered pubescence; median segment finely granular, rounded posteriorly, and sparsely pubescent; legs long, the tibiæ and tarsi spinose; petiole of abdomen long, about as long as the posterior tibiæ, rest of the abdomen short, subglobular, vertically compressed. Black; the petiole and abdomen polished and shining; the clypeus and sides of the face with silvery pile, the pubescence on the thorax greyish; wings subhyaline, the apical margin fuscescent.—The clypeus in the female has its anterior margin waved, almost transverse, with two short teeth in the middle. In the male the clypeus is emarginate anteriorly and destitute of teeth.

Fig. 64.
Sphex nigellus, ♀. 1/1.

Hab. Sind; Ahmedabad; Bengal; Burma; Tenasserim; China; Siberia; Swan River, Australia. ♀. *Length* 17–19; *exp.* 34–36 mm. ♂. *Length* 15–18; *exp.* 30–33 mm.

469. **Sphex umbrosus.**

Sphex umbrosa, *Christ, Naturg. Ins.* p. 293, tab. xxix, fig. 2, ♀.
Sphex rufipennis, *Fabr. Ent. Syst.* ii, p. 200.
Sphex argentata, *Fabr. Ent. Syst.* ii, p. 200.
Sphex albifrons, *Fabr. Ent. Syst.* ii, p. 207.
Sphex argentifrons, *Lepel. Hym.* iii, p. 337, ♂.
Sphex carbonaria, *Smith, Cat.* iv, p. 247, ♀.
Sphex ephippium et opulenta, *Smith, Cat.* iv, pp. 249 & 250, ♀ ♂.
Sphex diabolica, *Smith, Jour. Linn. Soc.* 1858, p. 100, ♀.
Sphex plumifera et nigerrima, *Costa, Ann. Mus. Zool. Univ. Nap.* 1862, p. 112.
Sphex metallica, *Taschenb. Zeits. Naturwiss. Halle,* 1869, p. 414, ♀ ♂.
Sphex tuberculata, *Smith, A. M. N. H.* xii, 1873, p. 291.
Sphex luteifrons, *Grib. Ann. Mus. Civ. Gen.* (2ª) i, 1884, p. 300.
Sphex taschenbergi, *Magretti, Ann. Mus. Civ. Gen.* (2ª) i, 1884, p. 581.
Sphex umbrosus, *Kohl, Ann. Naturhist. Hofmus. Wien,* v, 1890, p. 406, ♀ ♂.

♀ ♂. Head and thorax in front pruinose, very finely and closely punctured; median segment pubescent, finely transversely striate; petiole of abdomen thinly pubescent, rest of the segments broadly subfusiform, closely and finely aciculate at base, finely and sparsely punctured on the apical margins above, slightly shining; clypeus very slightly convex, its anterior margin arched in the ♀, transverse, almost emarginate in the ♂, thickly pilose and pubescent; front (♀) furrowed from the anterior ocellus to between the antennæ, flat in the ♂; scutellum notched in the middle, postscutellum bituberculate; median segment long, narrowed and rounded posteriorly, the apex abruptly steep; legs long, the tibiæ and tarsi thickly spinose. Jet-black; the sides of the face and the clypeus with a dense close silvery pubescence, the pubescence on the thorax and petiole soft, thin, and hoary white; wings clear hyaline, lightly and broadly fuscescent at apex.

Var. *rufipennis*, Fabr., is black with black pubescence, and flavo-hyaline wings fuscescent at apex. Varieties (*tuberculata*, Smith; *luteifrons*, Rados. &c.) have the front and clypeus covered with a dense golden pile.

Hab. Spread through the Eastern Palæarctic region in China and Japan; in the Oriental, throughout India, Burma, Tenasserim, Ceylon, and the Malayan subregions down to Australia; and in the Ethiopian region, in Lake Nyassa, Transvaal, Congo, Guinea, Senegal, Gambia, Sierra Leone, and Arabia. ♀. *Length* 26–36; *exp.* 48–52 mm. ♂. *Length* 24–29; *exp.* 40–46 mm.

470. **Sphex aurulentus.** (Pl. II, fig. 6.)

Sphex aurulenta, *Fabr. Mant. Ins.* i, p. 274; *Kohl, Ann. Naturhist. Hofmus. Wien,* v, 1890, p. 392, ♀ ♂.
Pepsis sericea, *Fabr. Syst. Piez.* p. 211.
Sphex fabricii, *Dahlb. Hym. Eur.* i, p. 27, ♀.
Sphex ferruginea, *Lepel. Hym.* iii, p. 345, ♀.
Sphex lineola, *Lepel. Hym.* iii, p. 335, ♂.

Sphex ferox, *Smith, Jour. Linn. Soc.* 18(2, p. 55, ♂.
Sphex lepeletierii, *Sauss. Novara-Reise, Hym.* p. 40, ♀.
Sphex godeffroyi, *Sauss. Stettin. ent. Zeit.* xxx (1869), p. 57, ♀.
Sphex aurifex, *Smith, Cruise Curaçoa, Brenchley,* p. 460, ♀, pl. 44, fig. 3.

♀ ♂. Head densely pruinose and pubescent, the pubescence long, soft, and rather sparse; pro- and mesonotum densely pruinose, scutellum and postscutellum bare; median segment thinly pruinose and pubescent; legs and abdomen bare, smooth, and shining; clypeus slightly convex, its anterior margin rounded, thickly pubescent on the sides, with a subtriangular bare space in the middle anteriorly; scutellum and postscutellum notched in the middle; median segment long, with transverse ridges, posteriorly rounded and abruptly sloped at apex; legs long, the tibiæ and tarsi spinose; petiole of the abdomen rather short, remaining segments broadly subfusiform, the apical two lightly punctured above, the whole of the abdomen smooth and shining. Head and thorax variegated with red and black; the legs, the petiole, and basal one or two joints of the abdomen red; the head and thorax covered with dense ferruginous-red pile and sparse pubescence of the same colour; the apical segments of the abdomen black; wings hyaline, broadly fuscescent at apex, nervures testaceous, tegulæ red. A very variable insect.

Var. *ferrugineus*, Lepel., has the whole head, thorax, femora, tibiæ, and basal joints of tarsi red; the abdomen black and shining: and the dense silky pile and soft sparse pubescence on the head and thorax of a rich golden ferruginous colour.

Var. *lineolus*, Lepel., has the head, thorax, legs, and petiole of the abdomen, except at apex, black, and the remaining segments of the abdomen dark red with black markings above; the pubescence on the head and thorax is silvery white.

These are the two commonest varieties of the insect found in India.

Hab. India; Burma; Tenasserim; Ceylon; China; and the Malayan subregions as far as North Australia. ♀. *Length* 20–28; *exp.* 39–48 mm. ♂. *Length* 18–26; *exp.* 40–46 mm.

471. **Sphex edax,** n. sp.

♀. Head smooth and shining, finely and sparingly punctured, square above, and broader than the thorax, with the cheeks behind the eyes well developed; clypeus subtriangular, somewhat porrect, its anterior margin arched; front slightly concave, vertex very slightly arched, almost flat, with a shallow abbreviated sulcation behind the ocelli; the sides of the face and the clypeus densely pilose; pro- and mesonotum, scutellum and postscutellum finely and sparsely punctured; median segment massive, long, rounded posteriorly, pubescent, shining, and finely and closely punctured, its apex steeply sloped; legs very stout, the femora and tibiæ massive and broad, the tibiæ and the tarsi studded with thick short spines; petiole of the abdomen of medium length, stout, and scarcely

curved; abdomen broad and massive, thinly pruinose. Head, thorax, legs, petiole, and basal segment of the abdomen black; the clypeus and sides of the face with dense silvery pile; the back of the head, pronotum anteriorly, and median segment with a soft thin greyish pubescence; the posterior margin of the basal segment of the abdomen and the following segments dull red; the mandibles massive, black and shining at base, and their apex dull red in the middle; the wings light fusco-hyaline with a purple effulgence; nervures and tegulæ black.

Fig. 65.
Sphex elax, ♀. 1/1.

♂ similar, but with a smaller and less massive head and paler wings; the anterior margin of the clypeus is less arched and armed with six teeth.

Hab. Sikhim; Tenasserim; Ceylon. ♀. *Length* 30; *exp.* 50 mm. ♂. *Length* 29; *exp.* 48 mm.

This species is allied to *Sphex umbrosus*, Christ, but can be distinguished at once by the sculpture of the median segment, and in the male by the remarkable toothed clypeus.

(GROUP III. *Claws tridentate.*)

472. **Sphex viduatus,** *Christ, Naturg. Ins.* p. 305; *Kohl, Ann. Naturhist. Hofmus.* v, 1890, p. 332, ♀ ♂.
Sphex fervens, *Fabr.* (*nec Linné*) *Syst. Ent.* p. 346.
? Sphex pubescens, *Fabr. Ent. Syst.* ii, p. 209.
Enodia canescens, *Dahlb. Hym. Eur.* i. p. 28.

♀. Head and thorax densely pubescent, punctured under the pubescence, the mesonotum more closely than the head and pronotum, scutellum notched longitudinally; median segment long, abruptly truncate posteriorly, finely transversely striate, above with a very broad shallow groove from base to margin of truncation; abdomen smooth and shining, curved downwards. Head, thorax, legs, and petiole of abdomen black; abdomen red, the pubescence on the head and thorax silvery; the legs obscurely pruinose; wings hyaline; nervures and tegulæ dark, somewhat testaceous brown.

Fig. 66.—*Sphex viduatus*, ♀. 1/1.

♂ similar, with a longer petiole.

Hab. Throughout India; Ceylon; China; Syria; Egypt; Gambia; Sierra Leone; Guinea. ♀. *Length* 18–24; *exp.* 38–44 mm. ♂. *Length* 16–20; *exp.* 36–42 mm.

Genus AMPULEX.

Chlorion, pt., *Fabr. Syst. Piez.* p. 217 (1804).
Ampulex, *Jurine, Hym.* p. 132, pl. 14 (1807).
Rhinopsis, pt., *Westw. Arcan. Ent.* ii, p. 68 (1844).
Waagenia, pt., *Kriechb. Stettin. ent. Zeit.* xxxv, p. 55 (1874).

Type, *A. compressa*, Fabr.

Range. Both hemispheres.

Head flat; eyes with their inner orbits either parallel or convergent towards the vertex of the head, never divergent; antennæ filiform, short, and somewhat stout in proportion in some species; front often with carinæ extending upwards from the base of the antennæ; clypeus shaped somewhat like a ploughshare; the medial carina generally large, ending in a tooth or bifurcating towards the apex; mandibles sickle-shaped, simple in the female, dentate in the male. Prothorax elongate, the posterior middle portion raised, the raised portion narrower than the mesonotum, the posterior angles at a distance from the base of the wings; mesonotum broad, marked with longitudinally impressed furrows; median segment flat above, slightly narrowed towards the apex, and roundly truncate posteriorly, above with several longitudinal carinæ, the space between which is more or less closely transversely striate, the posterior lateral angles of the segment almost always with one or more erect tubercles; legs long, stout, the tibiæ and tarsi slightly spinose, the intermediate coxæ separated by a more or less narrow plate which forks posteriorly, intermediate tibiæ with two apical spines, claws toothed. Wings rather short; fore wing with one radial and two or three cubital cells, the forms with two cubital cells plainly derived from the form with three cubital cells by the obliteration of the 1st transverse cubital nervure, the beginning of which can be often traced in various two-celled species; when three cubital cells are present, the 1st and 3rd are subequal, each receiving a recurrent nervure, the 2nd small, square, or broadly rectangular. Abdomen pseudo-petiolate, the basal segment never narrowed into an actual petiole as in *Sphex*, generally roundly steep at base, the apex of the 1st segment in most cases constricted; the apical segments compressed, sometimes extraordinarily so, the 2nd ventral segment produced more or less at a right angle to the plane of the 1st, the joint between the median segment and the abdomen exceedingly flexible, the insect being able to double its abdomen beneath the thorax and protrude its sting between the fore legs in front.

Fig. 67. *Ampulex compressa*, ♀ $\frac{1}{1}$.

These beautiful insects are predatory on cochroaches (*Blatta*). In Burma I have frequently seen these wasps come into the house and search for their prey under boxes and furniture. In the forest once I watched a rather large specimen of *A. compressa*, Fabr.,

struggling with a huge cockroach; the latter was either paralyzed by a sting or dazed with fear, and was being half dragged by an antenna and fore leg, half hustled and pushed along by the active little wasp.

Key to the Species.

A. Fore wing with *three* cubital cells .... *A. compressa*, p. 254.
B. Fore wing with *two* cubital cells.
  a. Abdomen with the basal segment narrowed into a petiole.
    a'. Petiole linear at base, nodose at apex .. *A. constanceæ*, p. 255.
    b'. Petiole gradually widened to the apex, not nodose .... *A. ruficornis*, p. 255.
  b. Abdomen with the basal segment pseudo-sessile.
    a'. Raised central portion of the pronotum not elevated at back into a tubercle.
      a². Raised central portion of pronotum transversely striate .... *A. novaræ*, p. 256.
      b². Raised central portion of pronotum punctured.
        a³. Raised central portion of pronotum nearly cubical, as long as it is broad........................ *A. latifrons*, p. 256.
        b³. Raised central portion of pronotum much broader than long........ *A. cognata*, p. 257.
    b'. Raised central portion of the pronotum elevated posteriorly into a cone or blunt tubercle.
      a². Cheeks well developed, with a blunt rounded projection posteriorly .... *A. sikkimensis*, p. 257.
      b². Cheeks scarcely at all developed, straight, with no rounded projection posteriorly .... *A. crudelis*, p. 258.

473. **Ampulex compressa.**

Sphex compressa, *Fabr. Ent. Syst.* ii, p. 206.
Chlorion compressum, *Fabr. Syst. Piez.* p. 219.
Ampulex compressa, *Jurine, Hym.* p. 134.

♀. Head in front coarsely and strongly punctured; pronotum tuberculate at back, the raised portion transversely striate, with a short medial longitudinally-impressed line; mesonotum with one or two coarse punctures, the sides of the thorax more finely and closely punctured; median segment narrowed posteriorly and truncate, a medial short longitudinal carina from base, one each side of this slightly convergent posteriorly, another outer one on each side forming at apex a continuous loop along the edge of the truncation, a slight indistinct one outside again, and a fourth lateral carina on each side ending in a sharp upturned tubercle at each lateral posterior angle of the segment, the space between the carinæ transversely striate; legs stout, posterior tibiæ sparsely punctate; abdomen short, broad, the 2nd segment somewhat longer than broad. Brilliant metallic blue, sometimes green, the inter-

mediate and posterior femora deep red; the antennæ filiform, long; the flagellum and also the tarsi of the legs black: wings hyaline, slightly fuscescent; fore wing with three cubital cells, the 1st and 3rd subequal, each receiving a recurrent nervure, the 2nd small, nearly square, the 3rd or outer transverse cubital nervure received at some distance from the apex of the radial cell.

Hab. Throughout India, Burma, Ceylon, extending to Africa and to China. ♀. *Length* 15–20; *exp.* 22–30 mm.

474. **Ampulex constanceæ.**

Rhinopsis constanceæ, *Cam. Mem. Manch. L. Ph. Soc.* (4) iv, 1891, p. 192, pl. i, fig. 6.

♀. Head very minutely and closely punctured, giving it an opaque appearance; pro- and mesonotum, scutellum and postscutellum with a few scattered punctures; median segment coarsely rugose and reticulate; abdomen smooth and shining; pronotum with the middle portion raised and deeply longitudinally grooved; mesonotum convex, with four abbreviated longitudinal grooves not reaching the apex; median segment somewhat flat transversely, striate above, with a medial longitudinal carina and two lateral broader ones converging slightly towards the apex, the apex of the segment rounded, the sides vertical; abdomen smooth and shining, the petiole clavate at apex. Black; the mandibles, clypeus, antennæ, pronotum, the greater part of the mesopleuræ, and mesosternum and apex of the mesonotum, the tegulæ, the median segment, the coxæ, trochanters, the femora beneath, and tarsi reddish; the base of the tibiæ and apex of the femora obscurely rufescent; the base of the 1st petiolate abdominal segment whitish; wings hyaline, a broad fuscous band from the stigma obliquely across the wings.

Fig. 68. *Ampulex constanceæ*, ♀. $\frac{3}{1}$.

Hab. Poona, Bombay Presidency. ♀. *Length* 9; *exp.* 8 mm. Type in coll. Rothney.

475. **Ampulex ruficornis.**

Rhinopsis ruficornis, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 115, ♀.

♀. Head coarsely, thorax finely punctured; abdomen smooth, slightly shining; antennæ rather short, shorter than the thorax; eyes parallel, an indistinct short keel in front of the anterior ocellus; pronotum raised in the middle, with a deep longitudinal furrow; mesonotum shorter than the pronotum, with two posteriorly convergent, longitudinally impressed lines; scutellum and postscutellum smooth; median segment above finely transversely striate, posteriorly roundly truncate, with an indistinct broad furrow at apex; above the segment is flattish, with a posteriorly convergent

sulcation on each side, bounded on the inside by short carinæ, between which again there is a medial longer carina, the upper lateral angles of the segment tuberculate; petiole clavate at apex; 2nd abdominal segment long. Head and abdomen black; the antennæ, thorax, median segment, basal half of petiole of abdomen, and tarsi red: wings hyaline and iridescent; nervures testaceous, tegulæ blackish.

Hab. Barrackpore, Bengal. ♀. *Length* 10; *exp.* 11 mm.

*476. **Ampulex novaræ**, *Sauss. Novara-Reise, Hym.* p. 44, pl. ii, figs. 26 & 26 *a*; *Kohl, Ann. Naturhist. Hofmus. Wien,* viii, 1893, p. 468.

" ♂. The clypeus carinate, somewhat compressed. Head punctured, no carina on the front above, but above each antenna a short carina. Prothorax slender, strongly compressed, finely transversely striate, and divided by a longitudinal groove, not tuberculate posteriorly, but shining; the prosternum punctured. The mesothorax coarsely, the mesonotum still more coarsely punctured, the fovea on this short, deep, nearly orbicular. Median segment slender, the apex bidentate, not acutely truncate, above with transverse raised striæ, the raised longitudinal striæ complete. The medial carina at apex almost obtusely bifurcate; of the lateral carinæ, the 1st pair sinuate, at the base convex, then concave, lastly parallel, the 3rd pair convergent towards the apex, and continuous there with the arch of the medial one, 2nd pair free at base at their origin, at apex joined on to the arch of the 3rd pair; the lateral tubercles or teeth projecting sideways; the posterior face of the segment subconvex like the sides, coarsely reticulate. Abdomen highly polished, impunctate. Metallic blue; antennæ and the tarsi black; posterior femora red, with the apex blackish blue; wings hyaline, nervures fuscous.

"*Hab.* Darjiling, Sikhim. ♀. *Length* 16 mm. ♂. *Length* 12; *wing* 7 mm."

*477. **Ampulex latifrons**, *Kohl, Ann. Naturhist. Hofmus. Wien,* viii, 1893, p. 461.

♀. Front, vertex, and cheeks smooth, with scattered punctures; front and vertex broad: eyes very slightly convergent towards the vertex; antennæ remarkably stout, the joints of the flagellum constricted at their bases, length of 2nd joint not quite 2½ times its breadth at the apex; a short very slight carina over the base of each antenna; the medial carina of the clypeus bifurcating at its apical third, and forming at the margin two more small but distinct teeth; a middle tooth consequently absent; pronotum not raised into a tubercle, nearly cubical, above almost flat, with a median longitudinal deeply impressed line, and as well as the mesonotum coarsely but not thickly punctured, a stiff hair springing from each puncture; mesopleuræ with coarse scattered punctures;

median segment posteriorly with a very short lateral spine, or, strictly speaking, an obtuse protuberance; legs with the penultimate joint of the tarsus enveloping on all sides the basal half of the apical joint; the intermediate and posterior tarsi punctured; claws bifid. Abdomen with the dorsal plate of the 2nd segment about $1\frac{1}{4}$ times as long as it is broad. Metallic blue or green, sometimes slightly bronzy; the antennæ and tarsi black, the posterior femora red.

Hab. Sikhim. ♀. *Length* 16 mm. Unknown to me.

*478. **Ampulex cognata**, *Kohl, Ann. Naturhist. Hofmus. Wien*, viii, 1893, p. 462.

♀. Head and thorax punctured, the punctures large and coarse, very sparse on the mesonotum, scutellum, postscutellum, and sides of the thorax; the clypeal carina prominent, bifurcating close to the apex; eyes small, separated above by the length of the basal four joints of the flagellum of the antennæ; the 3rd, 4th, and 5th joints of the latter subequal; the raised portion of the pronotum very convex, transverse, much broader than long, divided medially by an impressed line; median segment with four carinæ, the inmost two convergent, roughly forming a triangle with the base, the next two rather close together, the outer ending in a blunt tubercle just below the upper posterior angle of the truncated apex of the segment, the spaces between the larger longitudinal carinæ with raised transverse striæ somewhat close together; legs stout, the posterior tibiæ with a few coarse punctures, the 2nd and 3rd joints of the tarsi sagittate, the subapical joint about half the length of the apical and overlapping it on the underside; abdomen strongly compressed, the apical four segments quite flat, vertical, the 2nd strongly produced below at right angles to the 1st, above not quite so broad as long. Dark shining bluish green; the central plate of the mesonotum, the apical abdominal segment above, and the apical three below brownish, the anterior tibiæ and basal joint of the tarsi and the posterior four femora deep red: wings hyaline, infuscated on the disc of the fore wing, the latter with an appendiculate radial and two cubital cells; the 1st cubital cell twice the length of the 2nd, receiving the 1st recurrent nervure very little after its middle, the 3rd cubital cell reaching beyond the radial and receiving the 2nd recurrent nervure; the 2nd transverse cubital nervure received at the apex of the radial cell.

Hab. Khási Hills. ♀. *Length* 27; *exp.* 39 mm. ♂ unknown.

479. **Ampulex sikkimensis.**

Waagenia sikkimensis, *Kriechb. Stettin. ent. Zeit.* xxxv (1874), p. 55.
Ampulex sikkimensis, *Kohl, Ann. Naturhist. Hofmus. Wien*, viii, 1893, p. 462.

♀. Head and mesonotum smooth, shining, with very sparse and fine punctures; front with three short abbreviated carinæ not

quite reaching the level of the anterior ocellus, the cheeks behind the eyes with a prominent tubercle; pronotum rising into a slight cone-shaped elevation posteriorly, with anteriorly a medial longitudinal furrow and a few obscure transverse wrinkles; median segment from above quadrate, with nine longitudinal carinæ, the medial and the next on each side not reaching the truncated posterior portion of the segment, the 3rd and 4th carinæ (counting from the middle on each side) very close together; the space between the carinæ transversely striate; the tubercles at the lateral posterior angles of the segment small; legs thin and long, the subapical joint of the tarsi short, produced at the sides into angular points; claws unidentate; abdomen smooth, polished; dorsal plate of 2nd segment nearly as wide as long. Metallic blue, in places with a greenish tint; antennæ and tarsi black; posterior femora red; wings hyaline, slightly fuscescent.

Hab. Sikhim; Chinese frontier. ♀. *Length* 16–17; *exp.* 20 mm.

A rare species: two specimens in the British Museum from the Chinese frontier, which I somewhat doubtfully identify as this species, are all I have seen.

480. **Ampulex crudelis**, n. sp.

♀. Head nearly smooth, with a few scattered punctures on the front; thorax and abdomen smooth, impunctate; clypeus strongly carinate, the carina reaching nearly to the anterior ocellus; at apex the clypeus is dentate on each side of the carina: from the base of each antenna an irregular short carina diverging slightly outwards goes up as high as about the middle of the inner orbits; the raised portion of the pronotum gibbous at the back and marked with a medial short slight keel; median segment narrowed posteriorly and truncate, with one short longitudinal carina in the middle, two short convergent carinæ, one on each side of the medial one, two other outer ones running to the lateral angles of an irregularly enclosed space on the verge of the truncation, and three more on each side beyond these and partially on the flanks of the segment; the space or hollows between these carinæ with transverse, raised, fine ridges, somewhat obsolete between the 2nd and 3rd carinæ on each side; posterior lateral angles of the median segment with two small tubercles, one above the other; legs stout, the posterior tibiæ impunctate; abdomen flat above, the basal segment constricted at apex, the 2nd segment not quite so broad as long, the apical segment strongly compressed. Shining brilliant metallic blue; the anterior tibiæ and posterior four femora red; antennæ and tarsi dull black; wings strongly infuscate on

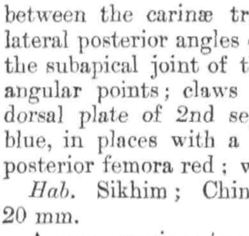

Fig. 69.
Ampulex crudelis, ♀. 1/1.

the disc, fore wing with two cubital cells, the 1st transverse cubital nervure merely indicated, the outer transverse cubital nervure received some distance from the apex of the radial cell.

Hab. Rangit Valley, Sikhim. ♀. *Length* 15–18; *exp.* 24–28 mm.

The nearest ally to this species is *A. erythropus*, Kohl, from Java.

Genus **DOLICHURUS**.

Pompilus, pt., *Spin. Ins. Lig.* fasc. 2, p. 52 (1808).
Pison, pt., *Latr. Gen. Crust. et Ins.* iv, p. 57 (1809).
Dolichurus, *Latr. Gen. Crust. et Ins.* iv, p. 387 (1809).

Type, *D. corniculus*, Spin.

Range. Both hemispheres.

Head subglobose, as wide as or wider than the thorax; a lamellar tubercle above the bases of the antennæ, concave above; eyes large, oval; ocelli complete, round, rather close together, placed in a triangle on the vertex; antennæ filiform, long, the scape thick, about as long as the 2nd joint of the flagellum; pronotum with the posterior portion raised, quadrate anteriorly, prolonged into a sort of neck; mesonotum very short, its posterior margin nearly in a line with the posterior margin of the tegulæ: scutellum large; median segment flat above, steep at the sides; posteriorly truncate, the upper surface with longitudinal carinæ somewhat as in *Ampulex*; legs long and slender; femora flattish. Wings—fore wing with one radial and three cubital cells; the radial cell long, narrow, acute at apex, not appendiculate; the 1st cubital cell very little longer than the 2nd, the 2nd nearly half as long again as the 3rd, the 2nd and 3rd narrowed towards the radial cell; the 1st transverse cubital nervure geniculated close to its origin and giving off a subobsolete oblique nervure in the 1st cubital cell. Abdomen pseudosessile, subcylindrical, with the margins of one or more of the basal segments constricted; the terminal segment in the Eastern species acute in the female.

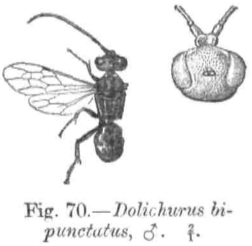

Fig. 70.—*Dolichurus bipunctatus*, ♂. ♀.

Nothing is on record as to the habits of the Eastern species of this genus.

Key to the Species.

a. Head and thorax entirely black; lateral angles of pronotum slightly produced, but not tuberculate .... *D. taprobanæ*, p. 260.

b. Head and thorax black, apex of tubercle above base of antennæ and lateral tubercles on pronotum whitish yellow .... *D. bipunctatus*, p. 260.

481. **Dolichurus taprobanæ,** *Smith, Trans. Ent. Soc.* 1869, p. 304, ♂ ; *Kohl, Ann. Naturhist. Hofmus. Wien*, viii, 1893, p. 511.

♀. Head, thorax, and abdomen smooth and shining, the front below the anterior ocellus rugulose, the mesonotum with a few scattered punctures; clypeus with a well-marked medial carina and covered with long stiffish hairs; lamella above the base of the antennæ concave above; eyes distinctly convergent towards the vertex; pronotum raised in the middle posteriorly, the raised portion with the posterior angles slightly projecting; median segment with four longitudinal carinæ, the outer pair joined by a transverse margin on the verge of the truncated apex of the segment: the space between the carinæ transversely rugose, the posterior lateral margins of the segment with a tubercle; abdomen with the apical margin of the basal segment strongly constricted, the apical segment narrow and very acute; wings hyaline and iridescent, nervures and tegulæ dark brown.

♂ similar, the front longitudinally striate.

Hab. Burma; Tenasserim; Ceylon. ♀. *Length* 10; *exp.* 16 mm. ♂. *Length* 8; *exp.* 16 mm. Type in the British Museum.

482. **Dolichurus bipunctatus,** *Bingh. Jour. Linn. Soc.* 1896, p.439.

♂. Head in front densely punctured; the vertex, occiput, pro- and mesonotum, and abdomen smooth; head and thorax with a thin short pubescence, dense only on the clypeus; pronotum with the back portion raised transversely, the lateral angles strongly tuberculate; mesonotum with two parallel longitudinal furrows; median segment, the sides steep, truncate posteriorly, above with two inner and two outer longer parallel longitudinal carinæ, the inner two and outer two joined separately by transverse carinæ; the space between the carinæ transversely rugose; legs stout, non-spinose, the femora flattened; abdomen short, the posterior margins of the basal two segments strongly constricted, the 1st above and below, the 2nd only above. Black, the pubescence fulvous white, the concave projecting plate above the base of the antennæ, on the outer margin, and the tubercles on the lateral angles of the pronotum whitish yellow; wings hyaline and iridescent, nervures and tegulæ testaceous.

Hab. Pegu Hills, Burma. ♂. *Length* 9; *exp.* 16 mm. ♀ unknown. Type in coll. British Museum.

Genus TRIRHOGMA.

Trirogma, *Westw. Trans. Ent. Soc.* iii, p. 223 (1841).

Type, *T. cærulea*, Westw.

Range. The Oriental region.

Head not quite so wide as the thorax, the vertex broad, the cheeks moderately well developed; the eyes oval, reaching down

to the base of the mandibles; ocelli complete, round, rather small, placed in a triangle on the vertex, somewhat close together; antennæ filiform, inserted beneath a rounded tubercle which is concave above; mandibles broader in the male than in the female; pronotum somewhat as in *Dolichurus*, with its posterior margin transverse and the lateral angles tuberculate; mesonotum short, its posterior margin not extending beyond the posterior margin of the tegulæ; median segment broad, flat above, with broad prominent lateral projections, truncate posteriorly, the sides not coming to a sharp angle and not tuberculate as in *Ampulex*, traversed dorsally and on the sides above by several longitudinal carinæ: legs long, slender, the intermediate coxæ not very widely separated, the coxæ and trochanters of all the legs remarkably long, the femora broad and flattened towards the base; intermediate and posterior tibiæ and tarsi slightly spinose, intermediate tibiæ with two apical spines, anterior tarsi not ciliated, claws unidentate in the middle below. Wings rather short; fore wing with the radial cell narrow, acute at apex; three cubital cells; the 1st equal or nearly equal on the cubital nervure to the 2nd and 3rd united, receiving the 1st recurrent nervure very close to or at its apex; the 2nd the smallest, the 1st and 2nd transverse cubital nervures enclosing it, arched outwards, then strongly constricted towards the radial cell, the 2nd recurrent nervure received at its apical third; the 3rd cubital cell broader at apex than at base. Abdomen broad, depressed, often with only three visible segments; the apical margins of the basal two strongly constricted.

Fig. 71.
Trirhogma cærulea, ♀. $\frac{3}{2}$.

Nothing, so far as I know, is on record as to the habits of the two species of *Trirhogma* found within our limits.

Key to the Species.

a. Abdomen smooth; mandibles black..........	*T. cærulea*, p. 261.
b. Abdomen delicately punctured; mandibles white at base	*T. prismatica*, p. 262.

483. **Trirhogma cærulea,** *Westw. Trans. Ent. Soc.* iii, p. 225, pl. xii, figs. 3 ♂, 3 *a* to 3 *e*; *Smith, Cat.* iv, p. 273; *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 114.

♀. Head in front closely and finely punctured; vertex, back of the head, pro- and mesonotum, scutellum, and postscutellum with a few scattered punctures; abdomen smooth, brilliantly polished and shining; clypeus slightly convex, its anterior margin arched; pronotum rising posteriorly, with the margin behind transverse and its lateral angles tuberculate; median segment broad, with four medial carinæ arranged more or less in W-shape and two outer lateral carinæ, the space between the carinæ reticulate.

Dark metallic blue; the head, thorax, and abdomen covered with a thin hoary pubescence, long and somewhat stiff on the clypeus; antennæ and the tarsi piceous black; wings hyaline, nervures and tegulæ piceous.

♂ very similar, more slenderly made, the lateral tubercles on the pronotum more prominent, and the scutellum more or less gibbous.

Hab. Throughout India, Burma, and Tenasserim, but not common. ♀. *Length* 15–21; *exp.* 26–30 mm. ♂. *Length* 11–14; *exp.* 20–24 mm.

484. **Trirhogma prismatica**, *Smith, Jour. Linn. Soc.* 1858, p. 99, ♂; *Kohl, Ann. Naturhist. Hofmus. Wien*, viii, 1893, p. 513.

♂. Closely allied to and resembling *T. cærulea*, Westw.; differs from the same sex in *T. cærulea* in the mandibles being white at base, the antennæ longer and more filiform, in the mesonotum having two transverse carinæ posteriorly, the space between rugose, the scutellum with an elevated tubercle anteriorly, the wings slightly fuscescent, the abdomen punctured and with violet and purple tints in certain lights.

Hab. Borneo; Tenasserim. ♂. *Length* 12–13; *exp.* 18 mm. ♀ unknown.

Genus PSEN.

Psen, *Latr. Précis Caract. Gen. Ins.* p. 122 (1793).
Sphex, pt., *Fabr. Ent. Syst. Suppl.* p. 243 (1798).
Pelopœus, pt., *Fabr. Syst. Piez.* p. 202 (1804).
Trypoxylon, pt., *Fabr. Syst. Piez.* p. 182 (1804).
Mimesa, pt., *Dahlb. Hym. Eur.* i, *Tabl. Spheg.* (1843).
Mesopora, *Wesm. Bull. Akad. Brux.* xix, pt. i, p. 279 (1852).

Type, *P. ater*, Panz.

Range. Both hemispheres.

Head transverse, as wide as the thorax; antennæ inserted in the middle or a little below the middle of the face, the flagellum subclavate; labrum concealed; mandibles acute, the apex bidentate, the inner tooth shorter than the outer; thorax very broad, subovate; pronotum transverse. Wings broad, ample; fore wing with the radial cell long, acuminate at apex; three cubital cells, measured on the cubital nervure the 1st about one-fourth longer than the 3rd, the second about half the length of the 3rd; the 2nd cubital cell narrowed towards the radial cell, receiving the 1st recurrent nervure before the middle; the 3rd cubital cell at apex about twice as broad as it is at base, receiving the 2nd recurrent nervure near its base. Abdomen very long, petiolate, the petiole about the length of the remaining segments; male with an upcurved spine at apex of abdomen; female posterior tibiæ serrated in the Indian species.

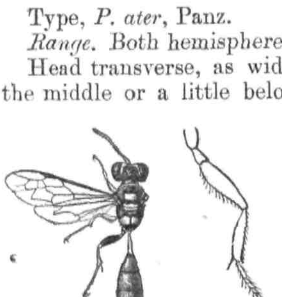

Fig. 72.
Psen pulcherrimus, ♀. $\frac{2}{1}$.

Four species only are known from India: nothing is known about their habits. The European species, however, are said to nest in bramble-stems and in the tubes of straw in thatched houses, and to store their nests with Aphides.

Key to the Species.

a. Head and thorax black, variegated with yellow	*P. pulcherrimus*, p. 263.
b. Head and thorax entirely black.	
a'. Abdomen black	*P. orientalis*, p. 263.
b'. Abdomen more or less red.	
a^2. Base of median segment depressed, with a furrow to the apex	*P. rufiventris*, p. 264.
b^2. Base of median segment not depressed, with one medial and two short lateral carinæ	*P. clavatus*, p. 264.

485. **Psen pulcherrimus**, *Bingh. Jour. Linn. Soc.* 1896, p. 443.

♀. Head above, thorax, and abdomen smooth and shining; clypeus small, convex, densely pilose, the front between the eyes broad, the flagellum of the antennæ setaceous, ocelli sunk, well separated from each other; the apex of the mesonotum and the sides and apex of the postscutellum with coarse, outwardly oblique striæ; median segment long, rounded posteriorly, with a well-marked medial longitudinal furrow; legs stout, posterior tibiæ minutely spinose; the apices of abdominal segments 2–4 slightly constricted. Head and thorax black; abdomen ferruginous red; the scape and basal five joints of the flagellum of the antennæ beneath, a line on the pronotum, a spot in front of the tegulæ, the tegulæ, a large square spot at the apex of the mesonotum, the scutellum and postscutellum, two large oblong spots at the apex of the median segment, the apex of the coxæ, the trochanters, femora, tibiæ and tarsi of the legs, and the petiole of the abdomen yellow; the posterior femora, tibiæ, and tarsi with a fuscous stain, the apex of the petiole below black; wings hyaline and beautifully iridescent, nervures testaceous.

Hab. Tenasserim. ♀. *Length* 7; *exp.* 12 mm. ♂ unknown. Type in coll. British Museum.

486. **Psen orientalis**, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii. 1890, p. 269, ♀.

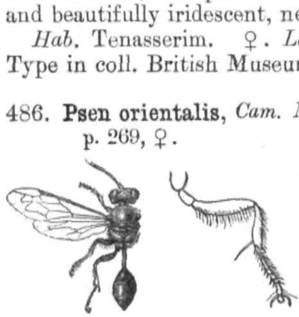

Fig. 73.
Psen orientalis, ♀. $\frac{2}{1}$.

♀. Closely resembling *P. rufiventris*, Cam., in form, but the clypeus is larger and more convex; the enclosed subtriangular space at base of the median segment is smaller, not depressed, finely not coarsely longitudinally striate, and with a shining broad medial furrow, which is continued beyond the apex of the enclosed space as a fine carina to the apex of the segment; the

sides of the median segment with some coarse rugose striæ. Entirely black, with sparse hoary pubescence on the head, the sides of the thorax, and median segment.

Hab. Madras; Pundaloya, Ceylon. ♀. *Length* 11; *exp.* 23 mm. Type in coll. Rothney.

487. **Psen rufiventris,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 267, ♀.

♀. Head and thorax thinly pubescent and pilose, most dense on the clypeus, the cheeks, the pleuræ, and the sides and apex of the median segment; the vertex of the head, the pronotum, scutellum, postscutellum, sides and apex of the median segment under the pubescence, and the abdomen smooth and shining; the clypeus, the front, and the mesonotum finely and strongly punctured; the clypeus convex, the apex produced, roundly emarginate, the sides oblique; median segment with a large subtriangular depressed space at base, coarsely longitudinally striate, and produced at apex into a broad deep furrow running to the apex of the segment; abdomen, the petiole as long as the head and thorax united, the rest of the abdomen slightly longer; the 5th segment with a marked constriction near its base. Black, the clypeus and cheeks with golden and the thorax with silvery pile; the mandibles, antennæ beneath, and the greater part of the legs testaceous, the 2nd and following abdominal segments more or less red shaded with fuscous black; wings hyaline and pubescent, nervures and tegulæ dark brown, nearly black.

Hab. Madras. ♀. *Length* 9; *exp.* 18 mm. ♂ unknown. Type in coll. Rothney.

*488. **Psen clavatus,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 268, ♀.

♀. "Smaller than *P. rufiventris* (8 mm. only), differing from it in the eyes being rounded in front, diverging at apex; in the antennæ being distinctly clavate, with the 3rd joint not twice the length of the 2nd (in *rufiventris* it is three times) and not much longer than the 4th; in the 3rd joint being nearly twice the length of the penultimate; in there being no furrow behind the ocelli; in the base of the median segment not being depressed and with three keels down the central part—one central and two lateral keels; the abdomen apart from the black petiole is entirely rufous; the 2nd cubital cellule is narrowed almost to a point at the top; the head and thorax are more distinctly aciculate, and there are two shallow furrows on the mesonotum, only the four anterior knees, tibiæ, and tarsi are testaceous, this being also the case with the hinder."

Hab. Poona.

Genus PEMPHREDON.

Crabro, pt., *Fabr. Ent. Syst.* ii, p. 293 (1793).
Pemphredon, *Latr. Préc. Caract. Gen. Ins.* p. 128 (1796).
Cemonus, *Jurine, Hym.* p. 214, pl. xi, gen. 28 (1807).
Ceratophorus, pt., *Shuck. Foss. Hym.* p. 198 (1837).
Diphlebus, pt., *Westw. Intr. Classif. Ins.* ii, *Syn. Gen.* p. 81 (1840).
Chevrieria, *Kohl, Mitth. Schweiz. ent. Ges.* vi, Heft 10, p. 658 (1883).

Type, *P. lugubris*, Fabr.

Range. Palæarctic region, and high elevations in the Oriental region.

Head large, subquadrate; eyes prominent, ovate; antennæ rather widely separated, inserted at the base of the clypeus, transverse; labrum small and triangular; mandibles stout, their apex dentate; thorax broadly oval; the mesonotum and median segment strongly convex, gibbous; wings with one radial and two cubital cells, the radial and 1st cubital cells subequal, but the latter oblong, the 2nd cubital cell nearly square, about half the length of the 1st cubital cell, each of the cubital cells receives a recurrent nervure; legs moderately long, slender, spinose; abdomen with the ventral plate of the basal segment forming a long slightly curved petiole, which is longer than the 2nd abdominal segment, the rest of the abdomen lanceolate; the apex of the abdomen with a single spine (♂) or canaliculate (♀).

The only Indian species at present known comes from an elevation of 7000 ft. in the Himalayas, and nothing is on record about its habits, which, however, probably resemble those of the European species. The latter nest in holes in old posts and rails, and provision their larvæ with Aphides.

489. **Pemphredon fuscipennis,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head and thorax sparsely, sides and apex of the median segment and the petiole of the abdomen above closely and rather coarsely punctured, abdomen smooth and shining; head, from above, subquadrate, broad, much broader than the thorax; median segment above smooth, with a semicircle of longitudinal short carinæ at its base. Black, the clypeus with silvery pile at the sides, and a fringe of long silvery hair at apex; the rest of the head, thorax, and abdomen with a very thin covering of short fuscous hairs: wings hyaline, shaded with fuscous on their apical halves; nervures brown, tegulæ black.

Hab. Mussooree, Northern India. ♀. *Length* 8–9; *exp.* 17 mm. Type in coll Rothney.

Genus STIGMUS.

Stigmus, *Jurine, Hym.* p. 139, pl. iii, gen. 7 (1807).

Type, *S. pendulus*, Panz.

Range. Both hemispheres.

Head subquadrate, a little wider than the thorax; antennæ inserted at the base of the clypeus; labrum concealed; mandibles dentate. Thorax ovate; median segment roundly truncate, longer than the mesonotum: wings proportionately large; fore wing with the stigma very large and conspicuous, one radial and two cubital cells, the radial cell acute at apex, the 1st cubital nearly twice the length of the 2nd, receiving the single recurrent nervure beyond the middle; the 2nd cubital cell nearly square: legs simple or very minutely spinose. Abdomen petiolate; petiole longer than the 2nd segment, the rest of the abdomen narrowly ovate, pointed at apex.

Fig. 74. *Stigmus congruus*, ♀. $\frac{4}{1}$.

The species of this genus are minute and easily overlooked. *S. congruus*, Walk., I found hovering about and settling in some numbers on a hard bank of earth, underneath a rock, on the higher hills in Tenasserim, in April; but whether the minute holes in the bank were tunnels made by them I cannot venture to say.

Key to the Species.

a. Clypeus subtriangular, not dentate nor porrect; legs testaceous	*S. congruus*, p. 266.
b. Clypeus transverse, subporrect, projecting at apex, with a minute tooth on each side; legs with anterior intermediate tarsi only testaceous	*S. niger*, p. 267.

490. **Stigmus congruus,** *Walk. A. M. N. H.* (3) v, 1860, p. 304, ♀; *Motsch. Bull. Soc. Imp. Nat. Mosc.* xxxvi, pt. 2, 1863, p. 23; *Kohl, Ann. Naturhist. Hofmus. Wien*, v, 1890, p. 63.

♀. Vertex of the head, pronotum, mesonotum anteriorly, scutellum, postscutellum, and abdomen smooth, polished and shining; clypeus subtriangular, slightly convex, surface minutely aciculate, anterior margin widely arched; front slightly hollowed, with very fine divergent striæ, the orbits marked off by a deep furrow consisting of a series of very close punctures; the posterior margin of the mesonotum with coarse longitudinal and rather deeply marked striæ; median segment coarsely reticulate, with a short deep groove on its posterior slope. Black, the mandibles except at apex, the scape, and basal three joints of the flagellum of the antennæ beneath, the nervures and tegulæ of the wings, and the legs testaceous; the tubercles white; wings hyaline.

Hab. Sikhim; Tenasserim; Ceylon. ♀. *Length* 7·5; *exp.* 12 mm.

491. **Stigmus niger**, *Motsch. Bull. Soc. Nat. Mosc.* 1863, p. 23.
Stigmus congruus, *Kohl, Ann. Naturhist. Hofmus. Wien*, v, 1890, p. 63 (*nec Walk.*).

♀. Closely allied to and resembling *S. congruus*, Walk., but the clypeus is markedly subporrect, projecting at the apex, with a blunt tooth at each side, and smooth, polished, and shining, not aciculate; the median segment is somewhat shorter and more steeply sloped; the base strongly coarsely striate, with a triangular space enclosed by convergent furrows continued from the apex of the enclosure to the apex of the segment as a deep medial furrow; the sides are coarsely reticulate; with a large oval smooth space in the middle. Black and shining, the mandibles in the middle, the scape of the antennæ, and the tibiæ and tarsi of the anterior and intermediate legs only testaceous.

Hab. Ceylon. ♀ *Length* 6; *exp.* 11 mm. ♂ unknown.

Kohl (*l. c.*) joins these two species, but the specimens I have seen differ as above, and I have kept them separate.

Genus **PASSALŒCUS.**

Pemphredon, pt., *Van d. Lind. Mem. Acad. Sc. Belg.* v, p. 78 (1829).
Diodonotus, pt., *Curtis, Brit. Ent.* iv, pl. 496 (1835).
Passalœcus, *Shuck. Foss. Hym.* p. 188 (1837).

Type, *P. insignis*, Van d. Lind.

Range. Palæarctic and Oriental regions.

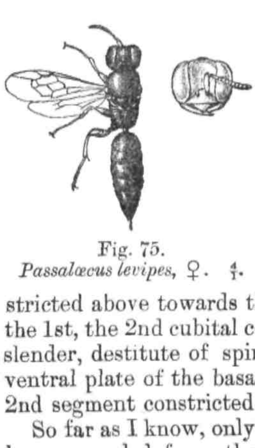

Fig. 75.
Passalœcus levipes, ♀. $\frac{4}{1}$.

Head subquadrate, wider than the thorax; eyes ovate, reaching down to the base of the mandibles, their inner orbits slightly convergent towards the clypeus; clypeus transverse, the labrum slightly exserted, entire; thorax elongate oval; pronotum transversely linear; mesonotum convex, gibbous anteriorly; median segment elongate, sloping posteriorly, not truncate. Wings—fore wing with one radial and two cubital cells; radial cell long, its apex acute; 1st cubital cell long, three times the length of the 2nd, which is constricted above towards the radial cell; the 1st cubital cell receives the 1st, the 2nd cubital cell the 2nd recurrent nervure. Legs short, slender, destitute of spines. Abdomen elongate, cylindrical; the ventral plate of the basal segment formed into a short petiole, the 2nd segment constricted at base.

So far as I know, only the one species described below has as yet been recorded from the Oriental region. The European species make their nests in rose-stems, old palings, &c.

492. **Passalœcus levipes**, n. sp.

♀. Head, thorax in front, and abdomen smooth, median segment coarsely transversely striate; clypeus subtriangular, transverse; front of the face and head strongly concave; the cheeks behind the eyes widened: median segment subcylindrical with the apex truncate; a wide shallow median longitudinal furrow from base to apex of truncation, face of truncation smooth and shining; abdomen longer than the head and thorax together, petiole short. Dark obscure green; the mandibles at base, the scape and basal three joints of the flagellum of the antennæ, the trochanters, base and apex of the femora, the tibiæ and tarsi of the anterior and intermediate legs, and the trochanters, tibiæ and tarsi of the posterior legs, yellow; wings hyaline and iridescent, nervures and tegulæ testaceous yellow.

Hab. Karennee, 4000 ft., Tenasserim. ♀. *Length* 8; *exp.* 15 mm. ♂ unknown. Type in the British Museum.

Genus **NYSSON**.

Mellinus, pt., *Fabr. Ent. Syst.* ii, p. 285 (1793).
Nysson, *Latr. Précis Caract. Gen. Ins.* p. 125 (1796).
Pompilus, pt., *Fabr. Ent. Syst. Suppl.* p. 246 (1798).
Ceropales, pt., *Fabr. Syst. Piez.* p. 185 (1804).
Oxybelus, pt., *Fabr. Syst. Piez.* p. 316 (1804).

Type, *N. spinosus*, Fabr.

Range. Both hemispheres.

Head transverse, as wide as the thorax or a little narrower; eyes ovate, ocelli in a triangle on the vertex; antennæ inserted at the base of the clypeus, the scape short, wider at apex than at base, flagellum slightly incrassate; clypeus wider than high, rounded anteriorly; mandibles unidentate. Thorax ovate, the pronotum transverse; median segment roundly truncate, with a stout spine on the posterior lateral angles; legs slender, simple, slightly pubescent.

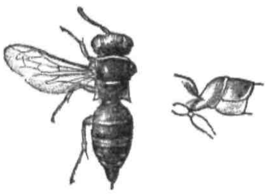

Fig. 76.
Nysson erythropoda, ♀. $\frac{3}{1}$.

Wings broad: fore wing with one radial and three cubital cells; the radial cell long, the apex acute, stretching beyond the cubital cells; 1st cubital cell longer than the 2nd and 3rd united, the 2nd petiolate, receiving both recurrent nervures; the 3rd equal to the 2nd, strongly constricted at top. Abdomen pseudosessile, the apex more or less curved downwards; 2nd ventral segment produced almost at right angles to the plane of the 1st segment.

Key to the Species.

a. Abdomen, basal segments red with lateral yellow spots .... *N. rugosus*, p. 269.

b. Abdomen, basal segments black with lateral yellow spots.
  a'. Wings hyaline; with a yellow stripe on the pronotum; legs red .... *N. erythropoda*, p. 269.
  b'. Wings fusco-hyaline; no yellow stripe on the pronotum; legs black........ *N. basalis*, p. 269.

493. **Nysson rugosus**, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 242, pl. ix, figs. 13 & 13*a*.

♀. Head, thorax, and abdomen coarsely rugose punctate, clypeus with the apex bidentate, a prominent wedge-shaped projection on the front above the base of the antennæ; median segment steeply sloped and concavo-truncate posteriorly; mesopleuræ prominent, punctured but not carinate beneath near the sternum. Black; a spot on the scape in front, the posterior margin of the pronotum, a short transverse line at the base of the scutellum, the anterior and intermediate coxæ in front, and elongated lateral spots on the posterior margins of the basal four abdominal segments, yellow; the spots on the 3rd and 4th segments small; the basal segment above, the basal two segments beneath, and the legs variegated with red; the face in front, the vertex and cheeks, and the sides of the thorax with silky silvery pile inclining to golden in certain lights; wings fusco-hyaline.

Hab. Barrackpore, Bengal. ♀. *Length* 7; *exp.* 13 mm. Type in coll. Rothney.

494. **Nysson erythropoda**, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 242, pl. ix, figs. 18 & 18 *a*.

♀. Clypeus porrect, finely punctured, the apex truncate; the front and vertex of the head, the scutellum, and postscutellum very coarsely and strongly punctured, rugose; the middle of the pronotum, the mesonotum, and the abdomen above less coarsely and more widely punctured, the punctures on the abdomen finer and shallower; median segment coarsely roughly reticulate, the apex concavo-truncate, its upper lateral angles tuberculate; mesopleuræ bulging, prominent, coarsely punctured, the angle below keeled; the metapleuræ smooth, the sides of the median segment coarsely punctured. Black; the posterior margin of the pronotum, a spot at the base of the scutellum, and lateral elongate spots on the basal two abdominal segments yellow; the mandibles, the tegulæ of the wings, and the legs red, the antennæ rufo-fuscous; the sides of the thorax and the coxæ and femora of the legs covered with glittering silvery pile; wings hyaline and iridescent, nervures testaceous.

Hab. Barrackpore, Bengal. ♀. *Length* 6½; *exp.* 12 mm. ♂ unknown. Type in coll. Rothney.

*495. **Nysson basalis**, *Smith, Cat.* iv, p. 355, ♂; *Handl. Sitzungsb. Akad. Wiss. Wien*, xcv, 1887, p. 401; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 241.

♂. "Length 4 lines (8·5 mm.).—Black, the face thinly covered

with silvery pubescence: the apical joint of the antennæ rufo-testaceous; the head and thorax rugose; the posterior angles of the metathorax covered with silvery pubescence; the wings fusco-hyaline. The base of the abdomen covered with silvery pile; at the lateral apical margins of the basal four segments an elongate subovate yellowish-white macula, each in succession smaller than on the basal segment, sometimes a minute one on the 5th segment; the lateral apical margins of the 6th and 7th segments produced into acute spines, the apical margin of the 7th rounded.

"*Hab.* India (coll. W. W. Saunders)."

Genus HELIORYCTES.

Heliorycte͏s, *Smith, Cat.* iv, p. 358.

Type, *H. melanopyrus*, Smith.

Range. Africa (West Coast); India; Burma.

"Head transverse, about the width of the thorax; eyes oval, converging at the vertex; the stemmata placed in a triangle towards the vertex; antennæ short, subfiliform, slightly thickened in the middle, pointed at the apex; the scape short, thick, and cylindrical; the first joint of the flagellum short, about half the length of the second, the rest of about equal length; mandibles toothed within, with a dentate process beneath towards the base; the labrum concealed. Thorax rotundate, the collar narrow, transverse; the scutellum transverse, oblong-quadrate; the metathorax truncated, with a mucro at the sides and about the middle of the truncation; the superior wings with one marginal (radial) and three submarginal (cubital) cells; the marginal cell elongate, rounded at the apex, slightly appendiculate; the first submarginal cell elongate, twice the length of the second and third united; the second submarginal cell petiolated; the third oblique, of nearly equal width; the first recurrent nervure received by the first submarginal cell near its apex; the second recurrent nervure entering the second submarginal cell near its apex; the legs stout; the anterior tarsi ciliated outside, the intermediate and posterior tibiæ spinose; the claws simple, having a pulvillus in their fork. Abdomen ovato-conic, truncated at the base, the apex acute."—*Smith.*

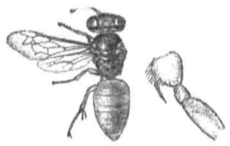

Fig 77.
Heliorycte͏s assimilis, ♀. $\frac{3}{1}$.

To Mr. Smith's accurate and full description I have to add an important particular—a detail of character which seems to have been overlooked. *The posterior coxæ are armed at their apex, in both ♀ and ♂, with a long acute spine pointing backwards.* In the type of the genus, the posterior coxa of which is figured above, this is very prominent; but in the Indian species described below the spine is reduced to an obscure tubercle on the underside of the coxa.

H. melanopyrus, on which this genus was founded, is from the

Gambia district in West Africa. From West Africa also there is in the collection of the British Museum one specimen of a third species of this genus, possessing the characters as given by Smith, and also the coxal spines. In the collection it stands as *Paranysson abdominale*, Guérin, and answers well enough to Guérin's brief description so far as this goes. The genus *Paranysson* was indicated (scarcely diagnosed) by Guérin in his 'Iconographie du Règne Animal de G. Cuvier: Insectes,' p. 441; but the description was so slight and incomplete that in my opinion Smith's name for the genus must stand. I may further note that Handlirsch (Sitzungsb. Akad. Wiss. Wien, 1887, p. 282) unites *Paranysson* with *Nysson*.

496. **Helioryctes assimilis**, n. sp.

♀ ♂. Head, the clypeus and front to a little above the base of the antennæ, the cheeks, and the sides and apex of the mesonotum and of the median segment densely pilose; the front above, the pro- and mesonotum, scutellum and postscutellum finely and closely punctured; the vertex of the head more sparingly punctured; median segment with a large triangular space at base enclosed by fine convergent carinæ, coarsely reticulate, the sides under the pile smooth; abdomen broad, as long nearly as the head and thorax together, subcordate, smooth and shining, the base slightly concave. Black, the abdomen dark red; the femora, tibiæ, and tarsi of the legs piceous, the dense pile on the head and thorax silvery; wings hyaline, lightly but broadly fuscous on their apical margins, nervures and tegulæ fuscous brown.

Hab. Sikhim; Tenasserim. ♀ ♂. *Length* 6–7; *exp.* 10 mm.

Genus GORYTES.

Crabro, pt., *Fabr. Syst. Ent.* p. 373 (1775).
Mellinus, pt., *Fabr. Ent. Syst.* ii, p. 285 (1793).
Pompilus, pt., *Fabr. Syst. Piez.* p. 187 (1804).
Ceropales, pt., *Fabr. Syst. Piez.* p. 185 (1804).
Gorytes, *Latr. Hist. Nat.* xiii, p. 308 (1805).
Arpactus, *Jurine, Hym.* p. 192 (1807).
Hoplisus, Euspongus, Lestiforus, Psammoecius, *Lepel. Ann. Soc. Ent. Fr.* i, p. 56 (1832).
Megalomma, pt., *Smith, A. M. N. H.* (4) xiii, p. 405 (1873).

Type, *G. mystaceus*, Linn.
Range. Both hemispheres.

Head transverse; eyes oval, the inner orbits convergent towards the clypeus or parallel, sometimes convergent in the female, parallel in the male; shape of clypeus dependent on convergence or otherwise of the eyes below; mandibles bidentate; labrum exserted and fringed with long setæ; antennæ inserted just above the base of the clypeus, the flagellum slightly incrassate or filiform; ocelli in a curve placed well forward on or just below the vertex. Thorax ovate; the pronotum transverse; the scutellum transverse,

rather long; median segment rounded, sometimes gibbous posteriorly, a small triangular space at base enclosed by furrows always present; legs of moderate length, stout, the trochanters two-jointed; anterior tarsi ciliated; the intermediate tibiæ with two apical spines. Wings somewhat broad in proportion: fore wing with one radial and three cubital cells, the radial cell elongate; the 1st cubital cell on the cubital nervure about the same length as the 2nd and 3rd united; the 2nd strongly narrowed towards the radial, receiving both recurrent nervures; the 3rd quadrangular and oblique. Abdomen ovato-conic, curved at apex; the basal segment often narrowed or subpetiolate campanuliform, or even produced into a lengthened somewhat slender petiole; the 2nd ventral segment in some species suddenly produced at right angles with the plane of the 1st segment.

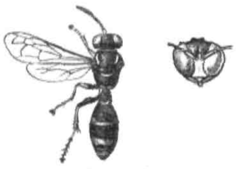

Fig. 78.
Gorytes alipes, ♀. ♀.

Key to the Species.

A. Eyes convergent below.
  a. Basal abdominal segment black.
    a'. Fore wing fasciated. Length, ♀ 5–6 mm. .... *G. ornatus*, p. 272.
    b'. Fore wing not fasciated. Length, ♀ 9–13 mm. .... *G. alipes*, p. 273.
  b. Basal abdominal segment red .... *G. amatorius* ♀, p. 273.
B. Eyes not convergent below; inner orbits parallel.
  a. Basal segment formed into a long petiole.. *G. greenii*, p. 274.
  b. Basal segment not formed into a petiole, but attenuated at base.
    a'. Head and thorax black.
      a². Basal abdominal segment red .... *G. amatorius* ♂, p. 273.
      b². Basal abdominal segment black.
        a³. Clypeus, ♀, entirely yellow .... *G. impiger*, p. 274.
        b³. Clypeus black, with a short yellow streak on each side at base .... *G. politus*, p. 275.
    b'. Head and thorax entirely red variegated with yellow, or red variegated with yellow and a little black ...... *G. pictus*, p. 275.

497. **Gorytes ornatus.**

Harpactus ornatus, *Smith, Cat.* iv, p. 371, ♀; *Handl. Sitzungsb. Akad. Wiss. Wien*, xcvii, 1888, p. 443; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 239.

♀. Head and thorax and 2nd abdominal segment very sparsely punctured, rest of abdomen smooth and shining; head broad, eyes distinctly divergent at vertex; a deep furrow between the mesonotum and scutellum, the enclosed space at the base of the median segment rugose. Black; the scape in front, the clypeus, a line along the inner orbits of the eyes, the labrum, palpi, and mandibles yellow; a ferruginous stain along the eyes at top and behind the

vertex; the thorax red: the abdomen with a narrow transverse band on the apical margin of the 2nd segment white, the band broadening on the side of the segment into a large ovate macula, the 5th segment white above; legs black, variegated with rufous; wings hyaline, with a faint subapical cloud crossing the front wing.

Hab. Northern India; Burma. ♀. *Length* 5–6; *exp.* 11 mm.

498. **Gorytes alipes**, n. sp.

♀ ♂. Head, thorax, and abdomen obscurely pruinose, eyes strongly convergent below; clypeus narrowly triangular, convex, its anterior margin transverse; front with a vertically impressed line; median segment slightly compressed laterally, roundly truncate posteriorly: a triangular space at base smooth and shining, enclosed by shallow convergent furrows, which, after junction, are continued as a single furrow to the apex of the segment; abdomen with the basal segment forming a stout petiole. Black, the clypeus, scape of the antennæ, a line on the pronotum posteriorly, a line on the anterior lateral margins of the mesonotum, the postscutellum, the anterior and intermediate femora, tibiæ, and tarsi, the posterior tibiæ and tarsi, and the apical margins broadly of the basal four segments of the abdomen yellow; the intermediate femora and the posterior tibiæ black above, the transverse band on the basal abdominal segment emarginate in the middle, and the bands on the remaining segments very wide laterally; clypeus covered with a dense silvery pile, flagellum of antennæ beneath fulvous; wings hyaline, nervures and tegulæ testaceous.

Hab. Bombay; Malabar coast; Tenasserim. ♀. *Length* 9–13; *exp.* 17–25 mm. ♂ slightly smaller.

499. **Gorytes amatorius**, *Smith, Tr. Ent. Soc.* 1875, p. 39, ♀; *Handl. Sitzungsb. Akad. Wiss. Wien*, xcvii, 1888, p. 536; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 240, pl. ix, fig. 15.

♀. Vertex of the head and thorax coarsely punctured, the punctures sparser and coarser on the thorax than on the head, the median segment and abdomen smooth, shining, almost impunctate; the eyes strongly convergent below; clypeus narrow laterally, almost twice as high as it is broad; front above the antennæ slightly concave, with a medial vertically-impressed line; median segment roundly truncate posteriorly. Black, the clypeus with thick silvery pile, the apex and sides of the median segment with a thin, short, hoary pubescence; the scape of the antennæ, a line on the pronotum, the tubercles, a spot above the tegulæ, the postscutellum, a broad transverse band (sometimes interrupted) at the apex of the basal abdominal segment, and narrower transverse anteriorly bi-emarginate lines on the posterior margins of the succeeding four segments white, the basal abdominal segment and the coxæ, femora, and the tibiæ anteriorly ferruginous, the tibiæ posteriorly and the tarsi white, the apical joint of the posterior tarsi black; wings hyaline, nervures and tegulæ testaceous.

♂ similar: differs in having the inner orbits of the eyes nearly

parallel, not strongly convergent towards the clypeus; the clypeus in consequence much broader, rounded anteriorly, black, not yellow: the legs more reddish; and the wings hyaline, with a sub-apical fuscous spot on the fore wing.

Hab. Barrackpore; Bombay. ♀. *Length* 7; *exp.* 14 mm. ♂. *Length* 6; *exp.* 14 mm.

It is with some hesitation I have assigned a ♂ from Bombay to the ♀ type of this species from Barrackpore; but the sculpture and markings are identical almost, notwithstanding the parallel non-convergent eyes and the maculated fore wing.

500. **Gorytes greeni,** *Bingh. P. Z. S.* 1896, p. 444, ♀, pl. xv, fig. 8.

♀. Head not so broad as the thorax, smooth, the front concave, medially finely furrowed, and with a few scattered fine punctures, obscurely pilose; clypeus transversely oval, slightly pubescent; pronotum and abdomen smooth and shining; mesonotum very finely, rather irregularly, longitudinally striate; scutellum, postscutellum, and the enclosed triangular space at the base of the median segment more coarsely longitudinally striate; sides and apex of the median segment pubescent, irregularly reticulate beneath the pubescence; pro- and mesopleuræ with obscure longitudinal fine striæ. Brownish red, the abdomen, except at base and apex of petiole and base of 2nd segment, much darker, almost black; the scape, a narrow line not reaching the vertex on the inner orbits, the base of the mandibles, a broad stripe on the posterior margin of the pronotum, the scutellum, a fine line posteriorly on the postscutellum, a broad band on the apical margin of the 2nd abdominal segment, a narrower, rather obscure line on the apical margins of the 3rd and 4th, and a broader one on the apical margin of the 5th, yellow; wings light flavo-hyaline and iridescent, the fore wing with a subapical large brown macula on the costal margin; tegulæ and stigma testaceous, nervures brown.

Hab. Ceylon. ♀. *Length* 14; *exp.* 32 mm. ♂ unknown.

The figure in the plate of the P. Z. S. has the petiole a trifle too long. This species belongs to the section separated by Smith as *Megalomma*.

501. **Gorytes impiger,** n. sp.

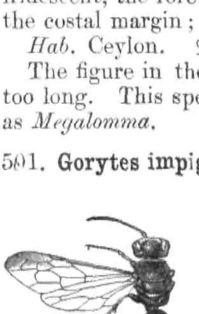
Fig. 79.—*Gorytes impiger*, ♀. ⅔.

♀. Head and thorax rather coarsely and abdomen at the bases of the segments rather finely punctured, the margins of the segments smooth; clypeus transverse, the front with a faintly impressed vertical line; the enclosed triangular space at the base of the median segment coarsely longitudinally striate, with the limiting furrows well marked. Dull dark brown, the mandibles, the clypeus, a broad line on the inner orbits about halfway up the front, a very fine line in the middle of the outer orbits, the scape of the antennæ, a broad line on the posterior margins of the

pronotum and of the scutellum, the tubercles, a spot behind them, the anterior and intermediate femora, tibiæ, and tarsi, and broad transverse fasciæ on the posterior margins of the 1st–4th segments of the abdomen above yellow; the flagellum of the antennæ, the anterior and intermediate femora beneath, and the posterior femora, tibiæ, and tarsi light ferruginous yellow; wings hyaline, the nervures and tegulæ testaceous yellow, the radial, the 2nd cubital, and the upper half of the 3rd cubital cell in the fore wing clouded with fuscous brown.

Hab. Tenasserim. ♀. *Length* 9; *exp.* 17 mm. ♂ unknown. Type in the British Museum.

502. **Gorytes politus**, *n. sp.*

♀. Head and thorax closely and finely punctured, the sides of the face and the clypeus densely and the abdomen lightly pruinose, clypeus subtriangular, interior orbits of the eyes parallel; the enclosed triangular space at the base of the median segment with the limiting furrows well-marked, the entire median segment posteriorly longitudinally striate. Black, the clypeus and sides of the face with dense silvery pile, an abbreviated yellow line on the upper lateral margins of the clypeus; a line on the pronotum, the tubercles, a broad line on the scutellum, and broad subapical transverse fasciæ on the 1st–4th segments of the abdomen above yellow; the margins of the segments narrowly testaceous brown; the flagellum of the antennæ beneath and at base above and the legs fusco-ferruginous; wings hyaline, the nervures and tegulæ testaceous, the costal margin of the fore wing at base narrowly and at apex broadly fuscous.

Hab. Bombay; Western India. ♀. *Length* 11; *exp.* 22 mm. ♂ unknown. Type in the British Museum.

503. **Gorytes pictus**, *Smith, Cat.* iv, p. 365, ♀; *Handl. Sitzungsb. Akad. Wiss. Wien*, xcvii, 1888, p. 537; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 240.

Gorytes tricolor, *Smith, Trans. Ent. Soc.* 1875, p. 40, ♀ ♂.

♀. Head, thorax, and abdomen with a few shallow scattered punctures, almost smooth; head about as wide as the thorax, face and front slightly concave, eyes not convergent below; clypeus transverse, slightly convex; median segment compressed, rounded posteriorly, almost truncate, the enclosed triangular space at base longitudinally striate. Head black; thorax and abdomen reddish; the base of the mandibles, the upper two-thirds of the clypeus, an elongate spot on the inner orbits above the base of the antennæ, a spot in front on the apex of the scape, a line on the pronotum, the tubercles, a broad stripe posteriorly on the scutellum, and a medially-interrupted obscure line on the posterior margin of the basal abdominal segment, yellow; the pronotum in front, the base of the scutellum, the postscutellum, the enclosed space at the base of the median segment, the base broadly of the 2nd abdominal segment, narrowly of the 3rd and 4th, and the whole

of the apical two segments black; the apical margin narrowly of the 2nd segment and broadly of the 3rd and 4th fulvous brown; the antennæ and legs pale reddish; wings hyaline, with a large fuscous subapical spot on the fore wing.

Var. The black on the thorax and abdomen replaced by red, and the fulvous brown on the 2nd–4th abdominal segments replaced by bright yellow; some specimens with the red colouring have the bases of the 2nd–4th abdominal segments black, as in the typical specimens.

♂ similar, but the clypeus and face up to the base of the antennæ entirely yellow.

Hab. Barrackpore; Calcutta; Madras. ♀. *Length* 7–9; *exp.* 16–18 mm.

Genus STIZUS.

Sphex, pt., *Fabr. Syst. Ent.* p. 346 (1775).
Crabro, pt., *Fabr. Syst. Ent.* p. 373 (1775).
Larra, pt., *Fabr. Ent. Syst.* ii, p. 220 (1793).
Stizus, *Latr. Hist. Nat.* iii, p. 344 (1802); *Handl. Sitzungsb. Akad. Wiss. Wien*, ci, 1892, p. 26.
Larra, *Smith, Cat.* iv, p. 337 (1856).

Type, *S. ruficornis*, Fabr.

Range. Both hemispheres.

Head subglobose, generally not so wide as the thorax; front slightly concave; ocelli placed in a triangle on the vertex; eyes large, ovate, their inner orbits parallel, often slightly convergent towards the clypeus; clypeus transverse, broader than long; labrum exserted, but not so markedly as in *Bembex*, its anterior margin rounded; mandibles not dentate within nor incised on their outer margin; antennæ more or less filiform, in the male the apical joints often abnormal, spined, curved, &c.; thorax stout; the pronotum transverse; the median segment of varying form, generally short, truncate posteriorly, sometimes concavo-truncate with the sides compressed and produced; legs moderately long, the anterior tarsi in the female ciliated with long spines; the coxæ massive, the intermediate tibiæ with two apical spines; the intermediate and posterior tibiæ and tarsi moderately spinose, claws simple: wings of moderate length; fore wing with one radial and three cubital cells, the radial cell short; the 1st cubital cell, measured on the cubital nervure, equal to the 2nd and 3rd united, the 2nd cubital cell strongly constricted towards the radial, sometimes petiolate, receiving both recurrent nervures; 3rd cubital cell oblique, wider on the cubital than on the radial nervure, the outer transverse cubital nervure curved inwards towards the

Fig. 80.—*Stizus rufescens*, ♀. $\frac{1}{1}$.

radial cell: abdomen elongate, massive, the 1st segment never petiolate or narrowed, its base generally truncate or steeply sloped; no furrow between the 1st and 2nd ventral segments; pygidium bare, convex, the apex rounded, margined.

Very little is known of the habits of the species of this genus. In Burma *S. rufescens*, Smith, was common in the hot weather on the sandy banks of rivers, sitting on the damp sand in company with *Megachile*, *Nomia*, *Bembex*, &c. I never found its nest, but once caught a ♀ carrying a small *Cicada*.

Key to the Species.

A. Wings fuscous.	
a. Wings not hyaline at base or apex	*S. vespiformis*, p. 277.
b. Wings hyaline at base and at apex.	
a'. Apical three segments of abdomen red	*S. calopteryx*, p. 278.
b'. 2nd and 3rd and base of 4th segment of abdomen only red	*S. cornutus*, p. 278.
c. Wings hyaline at apex of fore wing only.	*S. blandinus*, p. 279.
B. Wings flavo-hyaline.	
a. Median segment striate at apex........	*S. melleus*, p. 280.
b. Median segment not striate.	
a'. Eyes with the inner orbits parallel. Length 20–25 mm..............	*S. rufescens*, p. 280.
b'. Eyes with the inner orbits divergent towards the apex. Length 14–20 mm.........................	*S. biclipeatus*, p. 279.
C. Wings clear hyaline.	
a. Head yellow, vertex only black. Length 13 mm.	*S. melanoxanthus*, p. 283.
b. Head black, the clypeus, a line along the inner orbit, and the scape of the antennæ only yellow. Length 7–10 mm.	
a'. Vertex around the ocelli punctured; mesonotum anteriorly with two parallel longitudinally impressed lines	*S. reversus*, p. 281.
b'. Vertex and mesonotum smooth.	
a². The yellow markings on the thorax and abdomen large, conspicuous.	*S. lateralis*, p. 281.
b². The yellow markings on the thorax and abdomen small and not conspicuous	*S. prismaticus*, p. 282.

504. **Stizus vespiformis.**

Sphex vespiformis, *Fabr. Spec. Ins.* i, p. 447.
Stizus vespiformis, *Dahlb. Hym. Eur.* i, p. 154; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 245; *Handl. Sitzungsb. Akad. Wiss. Wien*, ci, 1892, p. 147.

♀. Head, pronotum, and abdomen smooth and shining; mesonotum, scutellum, postscutellum, and median segment with

very minute and close but shallow punctures; head not quite so wide as the thorax; the clypeus broad anteriorly, broadly but not deeply emarginate, the sides oblique, the front flat; the anterior ocellus in a slight hollow; mesonotum anteriorly with a short, shallow, medial longitudinal furrow; median segment with a semicircular fine furrow about midway; abdomen stout, broad, much longer than the head and thorax united. Head, pronotum, anterior femora at apex, the tibiæ, tarsi, and 2nd and following segments of the abdomen red; the thorax and basal abdominal segment black; the clypeus covered with a thin silvery pile; wings fuscous, with a purple effulgence.

♂ similar, but the base of the clypeus, the vertex and head posteriorly, and the base of the 2nd segment of the abdomen black.

Hab. Punjab; North-West Provinces; Madras. ♀. *Length* 22–25; *exp.* 40–45 mm. ♂. *Length* 17–20; *exp.* 40–43 mm.

505. **Stizus calopteryx.**

Larra fasciata, *Fabr. Ent. Syst. Suppl.* p. 253 (*nec* Bembex (*recte* Stizus) fasciata, *Fabr. Spec. Ins.* i, p. 458); *Smith, Cat.* iv, p. 342.
Stizus fasciatus, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 244.
Stizus calopteryx, *Handl. Sitzungsb. Akad. Wiss. Wien*, ci, 1892, p. 110.

♀. Head, pronotum, scutellum, postscutellum, and base of median segment rather sparsely but finely, mesonotum and abdomen more closely punctured; clypeus convex, almost transversely rectangular, its anterior border very slightly emarginate; the enclosed space at the base of the median segment shining, rather sparsely but strongly punctured, with a trace of a medial longitudinal furrow which is continued down to the apex of the segment. Light red, the posterior face of the median segment and the basal three abdominal segments black; wings fuscous, with a brilliant purple effulgence, broadly hyaline at base and apex.

♂ similar, more slender, light red, the front and vertex of the head more or less, the mesonotum except a broad line laterally, the scutellum, postscutellum, median segment, basal three abdominal segments and basal half of the 4th black.

Hab. Sikhim; Barrackpore; Bangalore. ♀. *Length* 16–20; *exp.* 30–36 mm. ♂. *Length* 13; *exp.* 26 mm.

506. **Stizus cornutus.**

Larra cornuta, *Smith, A. M. N. H.* (4) xii, 1873, p. 403, ♀.
Stizus cornutus, *Handl. Sitzungsb. Akad. Wiss. Wien*, ci, 1892, p. 112; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 244.

♀. Head opaque, densely pilose on the front, the pile thin and sparse on the vertex and cheeks; pronotum smooth; mesonotum and scutellum densely pruinose, with a medial longitudinally impressed line on the disc of the former, and two other lateral parallel extremely short lines closer to the tegulæ; postscutellum, the base narrowly and the sides more broadly of the median

segment closely and finely punctured, the posterior half of the segment densely pubescent; abdomen smooth, slightly shining, the base densely pilose, the apical segment above with short stiff hairs. Black, the pile on the head and at the base of the abdomen, and the long pubescence on the median segment silvery; the 2nd, 3rd, and base of the 4th abdominal segment red: wings dark fuscous, with a purple effulgence, silvery hyaline at base up to the line of the basal nervure of fore wing, and at apex of the fore wing from beyond the 3rd cubital cell.

Hab. Bombay. ♀. *Length* 19; *exp.* 36 mm.

507. **Stizus blandinus.**

Larra blandina, *Smith, Cat.* iv, p. 340, ♀ ♂.
Stizus blandinus, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 244; *Handl. Sitzungsb. Akad. Wiss. Wien*, ci, 1892, p. 107.

♀. Head, thorax, and abdomen very finely and closely punctured; clypeus convex, broad, the anterior border emarginate in the middle, oblique at the sides; median segment convex medially at base and slightly pubescent. Black, the 2nd and following segments of the abdomen red: wings dark fuscous with a purple effulgence, the apex of the fore wing broadly hyaline; the clypeus, front of the face, and legs with silvery pile.

♂ similar, more pubescent, the pubescence silvery on the median segment, fulvous on the apical three abdominal segments.

Hab. Calcutta; North India (*Smith*); Allahabad. ♀ ♂. *Length* 16–20; *exp.* 35–38 mm.

508. **Stizus biclipeatus.**

Vespa biclipeata, *Christ, Naturg. d. Ins.* p. 223, tab. xix, fig. 6, ♀.
Larra cingulata, *Fabr. Ent. Syst. Suppl.* p. 253.
Larra nubilipennis, *Smith, Cat.* iv, p. 347, ♀.
Stizus biclipeatus, *Handl. Sitzungsb. Akad. Wiss. Wien*, ci, 1892, p. 137, pl. ii, fig. 15.

♀. Head and thorax opaque, finely and very closely punctured, the punctures shallow; the clypeus and front above the base of the antennæ thinly pilose; median segment densely pubescent, the front between the antennæ raised, convex, with a medial impressed line running up to the anterior ocellus; eyes moderately divergent at top; median segment short, steeply sloped from base and concavo-truncate at apex, the sides not produced back; abdomen smooth, slightly shining. Honey-yellow; a transverse stripe on the vertex between the eyes, a spot surrounding the anterior ocellus, the mesonotum (in the majority of specimens), the meso- and the metapleuræ, a crescentic mark on the median segment above, one or two oblique stripes on the truncated portion, and a transverse band on the apical margins of the basal two abdominal segments black, with some indistinct fuscous and ferruginous marks on the remaining segments; the mesonotum anteriorly with two abbreviated longitudinal lateral stripes yellow; wings fulvo-hyaline, a subapical fuscous cloud occupying the radial and 2nd and 3rd cubital cells of fore wing.

Var. The antennæ, mesonotum, and basal abdominal segment rufo-fulvous; the mesonotum yellow, with three parallel longitudinal black stripes.

♂ similar, but darker on the whole.

Hab. The Punjab; Ahmedabad, Western India; Allahabad; Sikhim; Pegu Hills, Burma. ♀. *Length* 14–18; *exp.* 28–34 mm. ♂. *Length* 13–17; *exp* 26–32 mm.

509. **Stizus rufescens.**

? Stizus delessertii, *Guér. Icon. Règn. Anim.* iii, p. 439.
Larra rufescens, *Smith, Cat.* iv, p. 349, ♀.
Stizus rufescens, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 245; *Handl. Sitzungsb. Akad. Wiss. Wien*, ci, 1892, p. 138.

♀ ♂. Closely allied to and resembling *S. biclipeatus*, but constantly larger. It is a very variable insect, but the type has the head, thorax, and abdomen very minutely punctured, with a very fine short erect hair springing from each puncture; clypeus much broader than high, slightly convex, pointed laterally, widely emarginate in the middle anteriorly; the enclosed space at the base of the median segment semicircular, with a short medial longitudinal furrow continued down the posterior truncated face of the segment to the apex. Rufo-fulvous, the base of the mandibles, the labrum, clypeus, antennæ in front, cheeks, pronotum, postscutellum, an arched stripe on the median segment, a large rounded lateral spot on the 2nd, and an elongate lateral spot at the base of the 3rd abdominal segment yellow; legs variegated with yellow; wings deep flavo- or fulvo-hyaline, with a subapical fuscous cloud on the fore wing.

Var. A broad **T**-shaped mark on the vertex and front of the head, a broad longitudinal stripe on each side on the mesonotum, joined by a transverse stripe anteriorly, an arched stripe on the median segment, the propleuræ, the mesopleuræ posteriorly, the metapleuræ and sides of the median segment, and broad transverse bands on the basal four segments of the abdomen black. Between these two extreme forms numerous variations in the amount and disposition of the yellow and black markings occur.

Hab. Throughout India south of the Himalayas, not ascending the hills to any height; Ceylon; Burma; China. ♀ ♂. *Length* 20–25; *exp.* 40–48 mm.

I have wholly failed to make out Guérin's species *S. delessertii*; his description would stand fairly well for one variety of Smith's species.

510. **Stizus melleus.**

Larra mellea, *Smith, Cat.* iv, p. 346, ♀.
Stizus melleus, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 244; *Handl. Sitzungsb. Akad. Wiss. Wien*, ci, 1892, p. 171.
Stizus orientalis, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 245, ♀.

♀. Head and thorax finely punctured; clypeus convex, widely emarginate anteriorly, the sides oblique; front flat, a **V**-shaped indistinct furrow from the sides of the ocelli to the base

of the antennæ; thorax covered with erect soft hairs; median segment short posteriorly, concavo-truncate, the truncation transversely striate; abdomen lightly punctured; plate of 2nd ventral segment simple; pygidial area coarsely punctured; the apex with a few stiff hairs. Yellow, variegated with pale brownish red; the flagellum of the antennæ, an obscure mark on the vertex of the head, three broad parallel longitudinal stripes on the mesonotum, the postscutellum, middle and apex of the median segment, basal and apical margins above of the 1st–5th segments, and the whole of the 6th segment of the abdomen pale brownish red; wings flavo-hyaline, nervures and tegulæ brown.

Hab. Barrackpore, Bengal. ♀. *Length* 24; *exp.* 45 mm. ♂ unknown.

511. Stizus reversus.

Larra reversa, *Smith, Cat.* iv, p. 349, ♀ ♂.
Stizus reversus, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 245; *Handl. Sitzungsb. Akad. Wiss. Wien*, ci, 1892, p. 56.

♀. Head, thorax, and abdomen smooth, shining, covered with a very short thin pubescence; in certain lights the surface is seen to be covered with obscure, very fine, shallow, close punctures; a large space round the ocelli and on the front coarsely punctured; mesonotum anteriorly with two medial abbreviated parallel longitudinally impressed lines, very smooth and shining; median segment widely and deeply emarginate posteriorly, the lateral posterior margins compressed; abdomen as long as the head and thorax united. Black; the clypeus, a spot above it, the scape and basal joint of the antennæ in front, the posterior margin of the pronotum, the tubercles, a spot on the tegulæ, a short line in front and a spot behind them, a spot on each lateral angle of the scutellum, a line on the postscutellum, the posterior lateral angles of the median segment, an interrupted yellow band on the basal segment of the abdomen, an entire one on the 2nd segment, widest laterally, a short transverse line in the middle of the 3rd, a narrow band on the 4th, and a spot on each side of the 5th segment yellow; legs variegated with, sometimes almost entirely, yellow; wings hyaline and iridescent, nervures dark testaceous.

♂ very similar, but a black spot always at the base of the labrum and another on the clypeus.

Var. The posterior margins of abdominal segments 1–5 with complete yellow transverse bands above.

Hab. Mussooree; Barrackpore; Sikhim; Central India; Bombay; Burma; Tenasserim; Sumatra. ♀ ♂. *Length* 9–10; *exp.* 17–21.

512. Stizus lateralis, *Cam. MS.*

♀. Very similar to some varieties of *S. reversus*, differing chiefly in the greater development of the yellow markings; the clypeus, the space above it, the underside of the scape and flagellum of the antennæ, a broad stripe on the posterior margin

of the pronotum, the tubercles, a large spot beneath them on the pleuræ, a broad stripe across the tegulæ, a large square spot at each lateral angle of the scutellum, the postscutellum, the posterior lateral angles broadly of the median segment, the apex of the femora, the tibiæ and tarsi of all the legs, a very large oval spot on each side of the basal abdominal segment, and transverse bands, greatly widened at the sides, on the posterior margins of segments 2–5, yellow.

Hab. Barrackpore. ♀. *Length* 7; *exp.* 13 mm.

513. **Stizus prismaticus.**

Larra prismatica, *Smith. Jour. Linn. Soc.* 1858, p. 103, ♀ ♂.
Stizus prismaticus, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 244; *Handl. Sitzungsb. Akad. Wiss. Wien*, ci, 1892, p. 55.

♀ ♂. Head, thorax, and abdomen shining, obscurely but very finely and closely punctured, each puncture bearing a fine, very short, recumbent hair; clypeus transverse, the anterior margin depressed, very slightly and widely emarginate; median segment posteriorly deeply excavate, the sides compressed and somewhat laminate, not incised. Black, suffused with brilliant tints of purple and blue in certain lights; the clypeus, a triangular spot above it, an abbreviated line at the inner orbits of the eyes, the scape in front and the flagellum beneath, the posterior margin of the pronotum, the tubercles, the outer margins of the tegulæ, an oblique spot on each side of the scutellum, a transverse line on the postscutellum, an elongate spot on the lateral angles of the median segment, an elongate spot on each side of the basal abdominal segment and a fascia on the apical margins of the 2nd–4th segments, with a spot on each side of the 5th segment, yellow; the fascia on the 2nd segment is broadest laterally; the fascia on the 3rd segment abbreviated; legs variegated with yellow; wings hyaline and iridescent.

Smith describes the male as having two parallel abbreviated lines on the mesonotum and the fasciæ on the abdomen entire, but in the common Indian and Burmese form the ♂ and ♀ are precisely similar. I have seen no specimen corresponding in colour with Smith's description, nor with the specimens from Borneo and Celebes in the British Museum. One variety wants the abbreviated fascia on the 3rd abdominal segment; a second form is altogether destitute of the yellow lateral spots on the basal abdominal segment.

Hab. Sikhim; Ceylon; Burma; Tenasserim. ♀. *Length* 9–11; *exp.* 17–20 mm. ♂. *Length* 8–9; *exp.* 17–19 mm.

NOTE.—Handlirsch (Sitzungsb. Akad. Wiss. Wien, ci, 1892, pp. 43 *et seq.*) has described several closely allied forms more or less resembling *S. prismaticus*, Smith. One of these is given from the Andamans, two or three others are stated to occur in the Oriental region. I do not know of the latter having been found within our limits. I append, however, short descriptions, taken from Handlirsch's work.

Stizus magrettii, Handlirsch.—Black, with strong tints of blue and purple, somewhat thickly pilose and moderately punctured. Wings distinctly fuscous. Clypeus, labrum, front below the insertion of the antennæ, inner orbits, a spot on the tegulæ, lateral spots on the basal abdominal segment, a somewhat narrow fascia on the 2nd and 4th, and lateral spots on the ventral segments yellow. Antennæ black, beneath ferruginous, scape beneath yellow. Legs black, variegated with yellow. Length 11–13 mm.

Hab. Oriental region.

Stizus proximus, Handlirsch.—Very closely allied to the above; slighter; clypeus black; antennæ beneath yellow; 5th abdominal segment in male with a fascia, in female with a spot on each side. Length 9–10 mm.

An Oriental species.

Stizus pusillus, Handlirsch.—Allied to the above and resembling it, but still slighter and smaller, the face below less wide. Clypeus in the ♂ yellow, in the ♀ marked with a large black spot. Body more pubescent and the clypeus more densely pilose than in *S. proximus*. The 3rd segment with a small yellow spot in the middle. Antennæ black, paler beneath; scape beneath yellow. Length 7–8 mm.

Hab. Andamans; Malacca; Java.

Stizus semperi, Handlirsch.—Closely allied to and resembling the preceding species. Form very slight; black, moderately shining blue, sparsely and finely pilose, and more minutely punctured than in *S. pusillus*. Clypeus, except a large black spot in the middle, the inner orbits, the margin of the pronotum, the tegulæ, lateral spots on the scutellum, a fascia on the metanotum, the non-incised angles of the median segment, and complete fasciæ on the 1st–4th abdominal segments yellow. Wings hyaline; antennæ black, yellow beneath; legs black, variegated with yellow. Length 9 mm.

Hab. Oriental region.

*514. **Stizus melanoxanthus.**

Larra melanoxantha, *Smith, Cat.* iv, p. 346, ♂.

Stizus melanoxantha, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 244.

Stizus melanoxanthus, *Handl. Sitzungsb. Akad. Wiss. Wien*, ci, 1892, p. 171.

"♂. *Length* 13 millim.—Yellow, the flagellum fulvous; the vertex black; the apical joints of the antennæ fuscous above; the tips of the mandibles rufo-piceous. The mesothorax, the post-scutellum, and two oblique lines on the metathorax uniting at its apex black; the wings hyaline, the marginal cell occupied by a fuscous cloud. The extreme base of the abdomen black, the black colouring produced in the middle into an angular spot which extends down half the length of the segment; the apical margins of the 1st and three following segments black, an angular black spot in the middle of their base; the apical segment ferruginous.

"*Hab.* India (coll. W. W. Saunders)."

Genus **BEMBEX**.

Apis, pt., *Linn. Syst. Nat.* ed. x, p. 574 (1758).
Bembyx, pt., *Fabr. Syst. Ent.* p. 361 (1775).
Bembex, pt., *Oliv. Enc. Méth.* iv, p. 288 (1789).
Bembex, *Latr. Gen. Crust. et Ins.* iv, p. 97 (1809).
Monedula, pt., *Dahlb. Hym. Eur.* i, p. 492 (1845).

Type, *B. rostrata*, Fabr.

Range. Both hemispheres.

Head broad, as broad as, but not broader than, the thorax; eyes large, ovate, nearly occupying the whole of the sides of the head, and reaching below to the base of the mandibles; their inner orbits generally closest in the middle, very slightly divergent above and below; ocelli complete, generally round, but small and inconspicuous; antennæ filiform, in the male with the joints of the apical half often abnormal, spined or excavate beneath; clypeus boldly convex, the anterior margin transverse, appearing emarginate owing to its convexity; mandibles narrow, oblique at apex, with three teeth, the inner two small, the inferior long and very acute; labrum exserted, very long and convex, pointed, with the mandibles crossing in X-shape over or behind it. Thorax broad, slightly vertically flattened; pronotum small, depressed beneath the level of the mesonotum; median segment short, roundly truncate posteriorly: wings somewhat short, radial cell of fore wing long and narrow; three cubital cells, the 1st forming a long triangle, equal to or longer than the 2nd and 3rd united, 2nd and 3rd subequal in length, the latter narrower than the 2nd, which latter receives both the recurrent nervures. Legs fairly stout, spinose; 1st joint of the anterior tarsi always ciliated, ciliæ often of great length; intermediate femora in male generally dentate beneath; intermediate tibiæ with a long apical spine anteriorly and a short one posteriorly; claws simple. Abdomen massive, broad, never petiolate, the 1st segment as broad as the 2nd and steep at base, the apical segment laterally often toothed or with a sinuate margin, the apex rounded, truncate or incised; one or more of the ventral segments, in a large majority of species, furnished with carinæ or tubercles, especially in the male. General colour of the insects black or ferruginous, with sinuate lacteous or yellow bands on the abdomen.

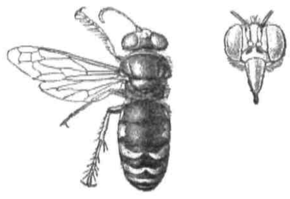

Fig. 81.
Bembex westonii, ♀. ½.

The habits of these insects are well known; they nest in sandy banks, some of the Indian species (e. g. *B. fossorius*) gregariously, digging their own tunnels and using their powerful ciliated anterior legs, in the manner of a dog digging. The food furnished for the larvæ is always, so far as I know, various species of Diptera, and some of the Indian species certainly do not close their nests, but frequently supply their larvæ with fresh food.

Key to the Species.

A. Disc of the mesonotum with a U-shaped mark.	
a. Colours ferruginous and yellow	*B. lunata*, p. 285.
b. Colours black and lacteous yellow	*B. melancholica*, p. 286.
c. Colours black and bright yellow.	
a'. ♀ ♂ length over 17 mm.	
a^2. Wings fuscescent	*B. buddha*, p. 287.
b^2. Wings flavo-hyaline..............	*B. sulphurescens*, p. 287.
b'. ♀ ♂ length under 17 mm.	
a^2. Apical segment ♀ ♂ marked with yellow	*B. trepanda*, p. 288.
b^2. Apical segment ♀ ♂ entirely black.	
a^3. Apical segment laterally sinuate..	*B. orientalis*, p. 289.
b^3. Apical segment laterally not sinuate, straight	*B. borrei*, p. 289.
B. Disc of mesonotum without any U-shaped mark.	
a. Joints of anterior tarsi broadly dilated ..	*B. latitarsus*, p. 289.
b. Joints of anterior tarsi not dilated.	
a'. Colours black and lacteous yellow.	
a^2. Lacteous yellow bands on the abdomen very broad	*B. pinguis*, p. 290.
b^2. Lacteous yellow bands on the abdomen narrow	*B. fossoria*, p. 290.
b'. Colours black and more or less bright yellow, not lacteous.	
a^2. Abdomen sulphur-yellow with black markings	*B. indica*, p. 291.
b^2. Abdomen black with bright yellow markings.	
a^3. Band on 1st segment interrupted in the middle	*B. hesione*, p. 291.
b^3. Bands on the three or more basal segments interrupted in the middle. Males only known.	
a^4. Intermediate femora dentate beneath......................	*B. taschenbergii*, p. 292.
b^4. Intermediate femora not dentate beneath....................	*B. ovans*, p. 292.
c^3. The basal two segments without bands, with only lateral spots ..	*B. westonii*, p. 293.

515. **Bembex lunata.** (Pl. II, fig. 4.)

Fabr. Ent. Syst. ii, p. 249; *Smith, Cat.* iv, p. 328; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 247; *Handl. Sitzungsb. Akad. Wiss. Wien*, cii, 1893, p. 777.

♀. Clypeus smooth and impunctate, convex, widely emarginate anteriorly; front, vertex of the head, thorax, and abdomen closely and finely punctured, thinly pubescent, the pubescence longish on the front, occiput, and sides of the median segment; inner orbits parallel; vertex slightly concavely depressed. Ferruginous, the labrum, mandibles except at base, clypeus, scape and basal joint of the flagellum of the antennæ, the inner orbits narrowly up to

the vertex, the outer orbits broadly but not reaching the vertex, the pronotum, a curved broad line on the median segment, the legs, irregular marks on the pro-, meso-, metapleuræ, and posterior angles of the median segment, an elongate patch on each side of the basal three abdominal segments, a broad subapical band on the following two, and a largish spot on the apical segment (sometimes wanting), yellow; the pronotum, coxæ, and femora of the legs have some obscure ferruginous marks, and the 4th and 5th abdominal segments a ferruginous spot on each side on the yellow; the vertex of the head, the front to the base of the antennæ, the occiput, pectus, sides of the thorax and of the mesonotum, a medial broad line on the last not reaching its posterior margin, the greater part of the median segment, and the bases of the 2nd and following segments of the abdomen (normally not seen) black; wings flavo-hyaline, nervures and tegulæ yellow.

♂ similar; the 7th abdominal segment ferruginous, with a yellow medial spot, the sides dentate.

Hab. Tranquebar; Tirhoot; Calcutta; Bombay. ♀. *Length* 23–25; *exp.* 36–45 mm. ♂. *Length* 18–24; *exp.* 40–45 mm.

516. **Bembex melancholica,** *Smith, Cat.* iv, p. 328, ♀ ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 247; *Handl. Sitzungsb. Akad. Wiss. Wien,* cii, 1893, p. 783, pl. ii, fig. 5, pl. v, fig. 17, pl. vii, fig. 5.

♂. Clypeus and front smooth, the vertex of the head finely punctured; thorax and abdomen more closely punctured than the head; the head above the occiput, thorax, and abdomen pubescent, the pubescence erect, soft, and rather long on the head and on the sides and apex of the median segment; vertex of the head concavely depressed, with a deep groove on each side of the ocellar area; antennæ with the 8th–10th joints spinous below, the 11th and 12th excavate, the 13th truncate at apex, the intermediate femora broad, with a rounded incision close to the apex on the underside; basal ventral segment of abdomen with a prominent tubercle; apical segment dentate laterally, the apex incised. Black, the pubescence fuscous on the head above and occiput, whitish on the median segment; the labrum, base of the mandibles, clypeus, sides of the face and front to a little above the base of the antennæ, the scape, the pronotum, a **L J**-shaped mark and a line above the tegulæ on the mesonotum, a curved band on the scutellum, another on the postscutellum, a triangular mark at the base and the posterior lateral angles and sides of the median segment, the pleuræ, and broad transverse bands, with their posterior borders emarginate in the middle and crenulate, on abdominal segments 1–6, with a triangular spot on the 7th segment, lacteous or livid yellow; the clypeus with two divergent rectangular spots at base, the middle of the pronotum, a few marks on the pleuræ, and an elongate oblique spot on each side above on the yellow bands of the 2nd–6th abdominal segments, black; legs lacteous yellow, variegated with black; wings clear hyaline, nervures and tegulæ dark brown.

I have not been able to procure a ♀, but, according to Smith, the sexes are identical, with of course the exception of the antennæ, femora, and 1st ventral segment; these in the ♀ would be simple (without spines, teeth, &c.).

Hab. Sikhim; Burma; Sumatra, and the Indo-Malayan region generally. ♀. *Length* 17–23 mm. ♂. *Length* 18–22; *exp.* 33–41 mm.

*517. **Bembex buddha**, *Handl. Sitzungsb. Akad. Wiss. Wien*, cii, 1893, p. 782.

"Antennæ (♂) incrassate, 8–11 joints spined below, 11–12 distinctly excavated below. Femora (♂) dentate on the apical half below. . . . . Wings distinctly fuscescent, nervures brown. ♀ 6th abdominal segment above without a medial area. ♂ apex of 7th segment rounded, not angulate laterally, a medial small carina towards the apex of the 2nd ventral segment, a small tubercle on the 6th, and three strongly convergent carinæ on the 7th segment. Thorax punctured and pubescent. Black, the orbits of the eyes, the front below, the labrum, the clypeus, with the exception often of two spots, the prothorax, the tubercles, four broad lines on the mesonotum, a fascia on the scutellum and on the metanotum, nearly the whole of the median segment, the greater part of the sides of the thorax, a broad fascia on the 1st abdominal segment, the 2nd segment, excepting the posterior margin and two spots on the disc, broad fasciæ, anteriorly bi-sinuate, on the following segments, the apex of the apical segment (♂ & ♀), and a spot on all the ventral segments yellow. Antennæ black, scape anteriorly yellow; legs yellow, lined towards the base with black."

Hab. Barrackpore, Tirhoot, and Madras. *Length* 21–23 mm.' Unknown to me. Apparently originally in coll. Rothney.

518. **Bembex sulphurescens**, *Dahlb. Hym. Eur.* i, pp. 180, 491, ♂; *Smith, Cat.* iv, p. 328; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 247.

♀. Head, thorax, and abdomen pubescent, the pubescence longish, soft, and erect on the vertex and back of the head and on the sides and apex of the median segment; the head smooth, finely and rather closely punctured behind the ocelli; thorax and abdomen with rather close but shallow fine punctures studded with recumbent hairs; vertex concavely depressed, the lateral furrows wide and shallow, ocellar area only slightly raised; eyes very little divergent beneath. Black, the labrum, base of the mandibles, clypeus, sides of the face as high nearly as the vertex, a doll-shaped mark on the front, the scape of the antennæ, the outer orbits up to the vertex, the pronotum, a ⊔-shaped mark on the disc, and the lateral margins of the mesonotum broadly, a broad curved line on the scutellum, another on the postscutellum, a third widest in the middle on the median segment, the posterior

lateral angles and sides of the last, the pro- and mesopleuræ, and broad transverse bands on the 1st–5th abdominal segments above sulphur-yellow, the band on the basal segment with four deep rounded emarginations anteriorly, and the bands on all the segments bisinuate posteriorly; two small spots on the clypeus, the middle of the pronotum anteriorly, some irregular marks on the sides of the thorax, and lateral spots on the bands of the 2nd–5th abdominal segments black; legs variegated yellow and black; wings slightly flavo-hyaline, nervures brownish, tegulæ yellow.

♂ similar, the 8th–10th joints of the antennæ spinose, and the 11th and 12th excavated beneath, the apical half of the intermediate femora serrate or dentate posteriorly, the apical segment of the abdomen with the lateral margins waved, scarcely dentate (in the ♀ these are straight), the 6th abdominal segment with a transverse yellow band.

Hab. Distributed pretty well throughout India and Burma, but not, so far as I know, yet procured in Western India. ♀. *Length* 18–20; *exp.* 31–34 mm. ♂. *Length* 18–19; *exp.* 32–36 mm.

519. **Bembex trepanda**, *Dahlb. Hym. Eur.* i, pp. 181, 490; *Smith, Cat.* iv, p. 328; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 247; *Handl. Sitzungsb. Akad. Wiss. Wien*, cii, 1893, p. 736.

♀. Head and thorax very finely and closely punctured, pubescent; abdomen shining, the surface very finely aciculate; the eyes slightly but distinctly divergent below; the apical segment of the abdomen triangular, punctured, the sides sinuated, the apex rounded, with a very slight short medial carina. Black; the labrum, the anterior margin broadly of the clypeus, a line behind the eyes, the pronotum, a **U**-shaped mark on the mesonotum, a line over the tegulæ, a curved line on the scutellum, another shorter one on the postscutellum, a third broader one, produced triangularly back in the middle on the median segment, the posterior lateral angles of the same, and more or less broad transverse bands on the basal four segments of the abdomen, with an oval spot on the sides of the 5th segment, bright yellow; these transverse bands on the abdomen vary in different specimens in width, and in the manner in which their margins are festooned or intruded on by the black ground-colour, but the band on the 2nd segment has always, on the 3rd sometimes, a black obliquely placed spot on each side; legs yellow, variegated with black; wings hyaline, nervures and tegulæ testaceous.

♂. In the two specimens I have seen the 6th–8th joints of the antennæ are spinose beneath, the 10th–12th joints excavate, and the apical joint curved, the intermediate femora dentate posteriorly, the dorsal plate of the apical segment emarginate at apex, and the clypeus and face to the posterior ocellus yellow. Otherwise the two sexes are similar.

Hab. Barrackpore; Bombay; Gilgit; Ceylon; extending into the Malayan region. ♀. *Length* 14–17; *exp.* 24–28 mm. ♂. *Length* 14–16; *exp.* 24–28 mm.

*520. **Bembex orientalis**, *Handl. Sitzungsb. Akad. Wiss. Wien*, cii, 189 p. 737, ♀ ♂, pl. i, fig. 18, pl. v, fig. 19, pl. vi, fig. 16.

♀ ♂. Closely allied to and resembling *B. trepanda*, Dahlb. The male differs in having only the 8th joint of the antennæ produced beneath, and the intermediate femora more serrate, and both sexes in having the eyes less divergent below.

Hab. Bengal; the Himalayas; Tenasserim. ♀ ♂. *Length* 12–15 mm.

521. **Bembex borrei**, *Handl. Sitzungsb. Akad. Wiss. Wien*, cii, 1893, p. 866, ♀ ♂.

♀ ♂. Thorax densely and very finely punctured, the punctures very shallow; head, thorax, and the base of the abdomen covered with a close short erect pubescence; clypeus convex, prominent, the face between the antennæ with a short carina; the antennæ rather long, with in the ♂ the 8th and 9th joints of the flagellum spinose beneath, the 10th–12th excavate, and the apical joint rounded and curved; thorax somewhat elongate; the basal joint of the anterior tarsi ciliated with six spines on the outside, the intermediate femora serrate beneath in the ♂; abdomen short, the apex conical: in the ♀ the 6th segment convex, the apex rounded, the sides not sinuate. Black, the apex and sides of the clypeus, the labrum and base of the mandibles, a line on the scape of the antennæ, a line on the pronotum, the tubercles, a ⊔-shaped mark on the disc of the mesonotum, a transverse stripe on the scutellum, another on the postscutellum, two on the median segment, lateral spots on the pro-, meso-, and metapleuræ, and very broad transverse bands on segments 1–4 of the abdomen in the ♀, and on all the segments in the ♂, yellow, the band on the 1st segment deeply bisinuate anteriorly, those on the 3rd and 4th with an enclosed black lateral spot; the 5th and 6th segments in the ♀ with a yellow lateral spot; legs yellow, the coxæ and base of the femora black; the pubescence on the head and thorax griseous, in fresh specimens silvery on the clypeus; wings light fusco-hyaline, darker in the ♂ than in the ♀.

Hab. Sikhim; Burma; Tenasserim; Ceylon, extending to Java. ♀ ♂. *Length* 12–16; *exp.* 27–30 mm.

522. **Bembex latitarsus**, *Handl. Sitzungsb. Akad. Wiss. Wien*, cii, 1893, p. 707.

♀ ♂. Eyes with their inner orbits distinctly divergent towards the clypeus. Front somewhat narrow, carinated below. In the ♂ the 8th–10th joints of the antennæ spined posteriorly; the 11th joint beneath slightly excavated and dilated, the apical two joints somewhat long. The anterior tarsi (♀ ♂) distinctly slender; intermediate joint a little prominent. In the ♂ the intermediate femora with short teeth on the underside, the apical tibial spine short, barely prominent; metatarsus long and a little dilated. In the ♂ the apical segment above widely triangular; the 2nd ventral

segment tuberculate. Black, head and thorax covered with griseous pubescence; the labrum, clypeus, the front below, the interior orbits widely, the exterior narrowly, a line on the pronotum, the tubercles, a spot on the sides of the prothorax, mesothorax, and median segment, uninterrupted bisinuate fasciæ on abdominal segments 1–5 above, a cordiform spot on the apical segment, and rather large spots in the middle of the ventral segments pale yellow; legs variegated yellow and black; antennæ black, palish below.

♂ has only the labrum yellow, the fascia on the 1st abdominal segment wanting; those on segments 2–4 narrow and interrupted in the middle, and only the scape of the antennæ pale beneath; wings (♀ ♂) hyaline, barely fuscescent.

Hab. Himalayas (*Handlirsch*); Mussooree; Gilgit. ♀. *Length* 17–19; *exp.* 33 mm. ♂. *Length* 15; *exp.* 30 mm.

523. **Bembex pinguis,** *Handl. Sitzungsb. Akad. Wiss. Wien,* cii, 1893, p. 784, pl. viii, fig. 4.

♀ ♂. Closely allied to and resembling *Bembex melancholica*, Smith, ♀ ♂: differ in wanting the testaceous yellow ⊔-shaped mark on the mesonotum; ♂ differs further in having the underside of the intermediate femora dentate, and in the 2nd ventral segment bearing a sharp, though small tubercle in the middle.

Hab. Calcutta; Assam; Tenasserim; Java. ♀ ♂. *Length* 20–23; *exp.* 36–38 mm.

524. **Bembex fossoria,** *Smith, Jour. Asiat. Soc. Beng.* xlvii, pt. 2, 1878, p. 168, ♀; *Bingh. Jour. Bomb. Nat. Hist. Soc.* v, 1890, p. 243, ♀; *Handl. Sitzungsb. Akad. Wiss. Wien,* cii, 1893, p. 895.

♀. Clypeus and front smooth; vertex of the head, thorax, and abdomen punctured, thinly pubescent; the punctures very fine, not dense, and rather shallow, closer on the abdomen than on the thorax; clypeus strongly convex, its anterior margin transverse, depressed at base on both sides of a medial carina running up between the bases of the antennæ; vertex concavely depressed, the ocellar region crossed with a deep groove on each side; occiput slightly emarginate, nearly transverse; antennæ smooth and shining; mesonotum anteriorly with a broad longitudinal depression, and a short carina along the bottom. Black, the labrum, base of the mandibles, clypeus, scape of the antennæ, the front to a little above the base of the latter, cheeks, posterior margin of the pronotum, tubercles, a line over the tegulæ, a parenthesis-shaped mark on each side of the scutellum and along the posterior margin, a crescentic mark on the postscutellum, a similar mark on the median segment, a large irregular mark on its side, a spot on the mesopleuræ above, the greater part of the propleuræ, the legs, and

Fig. 82.—*Bembex fossoria*, ♀. 1/1.

abdominal segments 1–5 above with broad submarginal bisinuate bands, lacteous yellow or white; two spots at the base of the clypeus, the coxæ, femora, and tibiæ of the anterior and intermediate legs posteriorly, and the coxæ, femora, tibiæ, and tarsi of the posterior legs both anteriorly and posteriorly, variegated with black; wings hyaline, nervures brownish yellow, tegulæ black.

♂ similar, but with 9th–11th joints of the antennæ flattened and carinated on the inside, the apical two segments black. In both sexes the 1st ventral segment is strongly, 2–6 faintly longitudinally carinate; the 2nd ventral segment with a small depression on each side of the medial line.

Hab. Burma; Tenasserim. ♀ ♂. *Length* 18–20; *exp.* 36–40 mm.

525. **Bembex indica.**

? Bembyx glauca, *Fabr. Mant. Ins.* i, p. 285.
? Vespa glauca, *Gm. Syst. Nat.* ed. xiii, p. 2769.
? Bembex glauca, *Fabr. Ent. Syst.* ii, p. 249.
Bembex indica, *Handl. Sitzungsb. Akad. Wiss. Wien*, cii, 1893, p. 771, pl. i, fig. 33, pl. vi, fig. 33, ♀ ♂.

♀ ♂. Clypeus and front of the face smooth, vertex of the head, thorax, and abdomen with fine close but shallow punctures and pubescent; the clypeus strongly convex, its anterior margin nearly transverse; vertex concavely depressed, ocellar region slightly raised. Pale sulphur-yellow; two diagonal spots above the base of the antennæ, the vertex of the head, the mesonotum, the base of the scutellum, also of the postscutellum and of the median segment, a spot on each side and one on the apex of the last joined by a narrow line, a diagonal spot on each side of abdominal segments 1–5 in the middle above, a pear-shaped spot in the middle of the 2nd ventral segment, and the spots on the following segments black; the mesonotum with two broad lateral lines and an apical transverse line joining them yellow; legs yellow; wings hyaline, nervures testaceous, tegulæ yellow.

♂ similar, with the 7th and 8th joints of the antennæ slightly produced below, the apical segment black with a lateral yellow mark.

Hab. Barrackpore; Sikhim; North-West Provinces; Bombay; Ceylon; extending into the Malayan region. ♀ ♂. *Length* 17–19; *exp.* 32–35 mm.

I have described the common type of this species; varieties have more or less the black markings wider and more distinct.

526. **Bembex hesione,** *Bingh. Jour. Bomb. Nat. Hist. Soc.* viii, p. 381.

♀. Clypeus and front smooth, with a few scattered punctures, head above pubescent, the pubescence soft and long, vertex with a deep furrow on each side of the ocellar region, which is raised; thorax and abdomen very minutely and closely punctured, with a short very fine recumbent hair springing from each puncture; abdomen with the 1st ventral segment tuberculate in the middle, the apical segment rounded posteriorly. Black, the labrum, base

of the mandibles, clypeus, sides of the face to a little above the base of the antennæ, a doll-shaped mark in the middle of the front, the scape of the antennæ, the cheeks, pronotum, sides of the thorax, a spot on the tegulæ in front, a spot behind them, a curved broad line on the scutellum, another on the postscutellum, one still broader in the middle and narrowly divided by a median black line on the median segment, the sides and posterior lateral angles of the same, an elongate triangular mark on each side of the 1st segment, and broad posteriorly biarcuate bands at the bases of segments 2–5, yellow or lacteous yellow; two spots at the base of the clypeus, a slight clavate spot on the front above it, the pronotum broadly in the middle, a spot on each tubercle, and an elongate oblique spot on each side above on the yellow abdominal bands black; the legs variegated yellow and black; wings hyaline, nervures and tegulæ dark brown.

♂ similar, but with the abdominal bands generally broader; the 7th–10th joints of the antennæ very slightly spinose, and the 11th and 12th excavated beneath; the intermediate femora dentate at apex, lateral margins of the apical abdominal segment waved, scarcely toothed, beneath carinate.

Hab. Tenasserim; Sumatra; Borneo. ♀. *Length* 22–24; *exp.* 35–37 mm. ♂. *Length* 19–20; *exp.* 36 mm.

*527. **Bembex taschenbergii,** *Handl. Sitzungsb. Akad. Wiss. Wien,* cii, 1883, p. 776.

"Head and antennæ nearly as in the European *B. bidentata,* Van der Lind., the wings distinctly fuscescent, nervures fuscous. ...... The anterior tarsi of normal form, the metatarsal cilia composed of seven spines. The intermediate femora towards the apex furnished with several distinct teeth. Abdomen as in *B. bidentata,* the 2nd and 6th ventral segments simple, the 7th segment with the lateral spines distinct.......

"Thorax above very finely and sparsely punctured, and covered with greyish pubescence.

"Black, the orbits of the eyes, clypeus, labrum, the greater portion of the pronotum, the tubercles, the sides of the mesonotum, fasciæ (often obsolete) on the scutellum, metanotum, and median segment, a large spot on the sides of the thorax and of the median segment, bisinuate fasciæ, often interrupted in the middle, on abdominal segments 1–5 above, a spot (often obsolete) on the 6th segment, and lateral spots on the ventral segments yellow. The apex of the abdomen, and sometimes part of the ventral segments, ferruginous. Antennæ black, scape pale; legs yellow, variegated with black towards their base.

"*Hab.* India; Tenasserim. ♂. *Length* 17–20 mm."

528. **Bembex ovans,** *Bingh. Jour. Bomb. Nat. Hist. Soc.* viii, p. 384, ♀ ♂.

♀ ♂. Closely allied to and resembling *B. fossoria,* Smith, but

the male has the antennæ cylindrical throughout, the 9th–11th joints not being flattened nor carinate on the inner side; both sexes are slighter and longer, the markings are brighter yellow, not lacteous, and the transverse bands on the basal three abdominal segments are more or less broadly interrupted in the middle.

Hab. Tenasserim. ♀. *Length* 22; *exp.* 34 mm. ♂. *Length* 21; *exp.* 36 mm.

529. **Bembex westonii,** *Bingh. Jour. Bomb. Nat. Hist. Soc.* viii, p. 380, ♀, pl. 1, fig. 1.

♀. Clypeus and front smooth; vertex of the head, thorax, and abdomen extremely minutely and closely punctured and pubescent, the pubescence longish on the occiput, vertex of the head, and sides of the median segment; clypeus lunate, convex, widely emarginate anteriorly, depressed at base on either side of a medial raised ridge, which is continued up the front to a little above the base of the antennæ, inner orbits parallel; vertex of the head subconcave, ocellar area raised, with a deep groove on each side, occiput transverse; median segment with a broadly triangular space at base enclosed by lateral convergent grooves, the posterior lateral angles slightly produced and flattened. Black, mandibles at base, clypeus, a doll-shaped mark above it, the inner and outer orbits widely interrupted at the vertex, the scape of the antennæ, pronotum, the tubercles, posterior lateral angles of the median segment, the greater part of the meso- and metapleuræ, the legs, an irregular elongate mark on each side of the basal three abdominal segments, and a broad biarcuate transverse band on the 4th and 5th above yellow; a spot on each side of the medial line of the clypeus at base, the middle of the pronotum, a spot on the tubercle, the greater part of the coxæ, a stripe posteriorly and anteriorly on each of the femora, and on the posterior tibiæ above, black; anterior tarsi slightly ferruginous; wings hyaline, nervures and tegulæ dark brown.

♂ similar, a black spot above the clypeus between the bases of the antennæ, the yellow band on the 4th segment narrowly interrupted in the middle, and a yellow spot on each side of the 6th segment of the abdomen.

Hab. Tenasserim. ♀. *Length* 22; *exp.* 39 mm. ♂. *Length* 23; *exp.* 40 mm.

Genus PHILANTHUS.

Philanthus, pt., *Fabr. Ent. Syst.* ii, p. 288 (1793).
Simblephilus, *Jurine, Hym.* p. 185 (1807).
Philanthus, *Shuck. Indigen. Foss. Hym.* p. 245 (1837).

Type, *P. coronatus*, Fabr.
Range. Both hemispheres.

Head large, wider than the thorax, subglobose; eyes emarginate or subemarginate within, in some Oriental species barely so; ocelli in a triangle forward on the vertex; antennæ inserted high up about the middle of the face and wide apart from each other; clypeus broad, with a lobe on each side; mandibles acute, the labrum concealed; thorax ovate, pronotum transverse; median segment obtusely rounded, sometimes steep posteriorly; legs stout, spinose, anterior tarsi (♀) strongly ciliated: wings of moderate length; fore wing with one radial and three cubital cells, radial cell narrow, elongate, and acuminate at apex; the 1st cubital cell measured on the cubital nervure about twice the width of the 2nd, the 2nd cubital cell narrowed at top, below receiving the 1st recurrent nervure in or a little past the middle, the 3rd cubital cell half the width at top that it is below, receiving the 2nd recurrent nervure near its base; abdomen with the 1st segment normal, or narrowed and subpetiolate at base.

Fig. 83. *Philanthus avidus*, ♀. 1/1.

Key to the Species.

A. First segment of the abdomen not narrowed at base into a petiole.
- *a*. Apical margins of abdominal segments 2–5 broadly depressed and finely transversely striate . . . . *P. nigriceps*, p. 295.
- *b*. Apical margins of the abdominal segments not depressed.
  - *a'*. Clypeus with its anterior margin bisinuate.
    - a^2. Abdomen for the greater part ferruginous red: wings flavo-hyaline . *P. depredator*, p. 295.
    - b^2. Basal segment of abdomen only ferruginous red; wings fuscous . . . . . . *P. basalis*, p. 296.
  - *b'*. Clypeus arched anteriorly.
    - a^2. Abdomen with transverse yellowish-white lines on the apical margins of segments 2–4.
      - a^3. Median segment rounded, with a narrow medial longitudinal furrow . . . . *P. ordinarius*, p. 296.
      - b^3. Median segment truncate posteriorly, with a broad medial longitudinal furrow . . . . *P. avidus*, p. 297.
    - b^2. Abdomen with large lateral spots on the basal 4 segments . . . . *P. elegans*, p. 297.
    - c^2. Abdomen with the apical margins of the basal 3 segments ferruginous . . *P. sulphureus*, p. 298.

B. First segment of the abdomen narrowed at base into a petiole.
- *a*. Clypeus carinate down the middle, head and thorax finely punctured. Length ♀ 11–12 mm. . . . . *P. concinnus*, p. 298.

b. Clypeus not carinate; head and thorax anteriorly coarsely punctured. Length ♀ 8 mm. .... *P. pulcherrimus*, p. 299.

530. **Philanthus nigriceps**, *Bingh. Jour. Linn. Soc.* 1896, p. 441.

♂. Head finely and closely punctured, thorax smooth and shining, the mesonotum, scutellum, and postscutellum with a few distant punctures, the median segment smooth and impunctate at base and down a medial line to the apex, the apex on each side closely punctured and pubescent; the legs punctured and covered with a thin pubescence; abdomen shining, with the bases of segments 2–5 broadly depressed, the depressed parts forming transverse bands very finely transversely striate; the basal segment, the apical margins of the 2nd-5th and the 6th and 7th segments entirely finely and distantly punctured, the anal segment slightly pubescent above and below. A remarkable feature is the clypeus, which is porrect and broadly emarginate in the middle anteriorly. Head and thorax black, abdomen dark chestnut-red; the mandible, except at apex, the clypeus, two spots above it, the inner orbits broadly below diminishing in width upwards, two large spots behind the eyes, a line on the pronotum, a spot before the tegulæ, a line on the postscutellum anteriorly, large triangular subapical spots on abdominal segments 1–4, and an irregular line interrupted in the middle on the 5th segment above yellow; legs rufo-piceous, the anterior femora, tibiæ, and tarsi, and the femora at apex, the tibiæ, and tarsi of the posterior legs with a deep fulvous tinge; wings fusco-hyaline and iridescent, the nervures and tegulæ testaceous, pubescence fulvous.

Hab. North-West Provinces. ♂. *Length* 13; *exp.* 24 mm.

531. **Philanthus depredator,** *Smith, Cat.* iv. p. 470, ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 248.

♀. Head, mesonotum, the pleuræ, and the basal abdominal segment very closely and somewhat finely punctured; the pronotum, scutellum, postscutellum, median segment, and the 2nd and following segments of the abdomen with a few fine scattered punctures; clypeus broad, anterior and posterior margins deeply bisinuate, the surface very finely and minutely aciculate; median segment shining, a very short and rather deep, medial, longitudinal furrow at base having a fine carina along the bottom and the space between the carina and the sides of the furrow with a single row of punctures. Ferruginous red, the base of the mandibles, the clypeus, a crescentic mark above it, an oval spot above that on the front, the sides of the face to the sinus of the eyes, the scape in front, the posterior margin of the pronotum, the tegulæ, a line on the anterior femora and on the intermediate tibiæ beneath, a large spot on each side of the 2nd and 3rd abdominal segments at base above, a crescentic mark on each

side near the apex on the 2nd ventral segment, and two triangular lateral spots on the 3rd ventral segment yellow; wings flavo-hyaline, slightly infuscated at apex, nervures ferruginous.

♂ similar, but with the scutellum, postscutellum, and a spot on each side on the median segment yellow.

Var.—♀ ♂. With the yellow markings more developed, the apical four abdominal segments fusco-ferruginous.

Hab. Barrackpore; North-West Provinces. ♀ ♂. *Length* 13–15; *exp.* 23–27 mm.

532. **Philanthus basalis**, *Smith, Cat.* iv, p. 473, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 248.

♀. Head, thorax (pronotum excepted), and basal segment of abdomen closely and not very coarsely punctured; the pronotum finely transversely striate anteriorly, posteriorly smooth; 2nd and following segments of abdomen smooth, opaque; clypeus broad, its anterior margin waved and fringed with stiff hairs; median segment truncate posteriorly, with a fovea at its apex above; pygidial area lightly and finely punctured. Black, the clypeus, the sides of the face anteriorly, a spot above the base of each antenna, a short vertical line below the anterior ocellus, a broad line on the cheeks, a very narrow one on the pronotum posteriorly, the postscutellum, a large oval spot on the apical margin of the 1st abdominal segment, a narrow medially-interrupted line on the apical margins of segments 2–4, and two minute spots on the apical margin of the 5th yellowish white, base of the 1st segment red; legs rufo-fuscous, the anterior and intermediate tibiæ with a stripe of yellow on the outside; wings light fusco-hyaline, the apex of the fore wing slightly more fuscescent, nervures and tegulæ dark fusco-testaceous.

Hab. Ceylon (*Smith*). ♀. *Length* 12; *exp.* 24 mm. ♂ unknown. Type in coll. British Museum.

533. **Philanthus ordinarius**, *Bingh. Jour. Linn. Soc.* 1896, p. 441.

♀. Head and thorax very finely and closely punctured; abdomen smooth, opaque; head slightly broader than the thorax, flattened in front, mesonotum convex, smooth and shining in the middle; scutellum large, prominent, impunctate in the middle; median segment rounded posteriorly, with a narrow medial longitudinal furrow, the apex and sides pubescent; legs with the tibiæ and tarsi, especially of the posterior pair, strongly spinose; abdomen broad, about as long as the head and thorax united; the dorsal plate of the anal segment incised at apex. Black, the mandibles, except at the apex, the clypeus, a crescentic spot above it, the inner orbits as high as the emargination of the eyes, a line along the outer orbits not reaching the vertex, a line on the pronotum, the tegulæ, a line on the posterior margin of the postscutellum, two small spots, one on each side, on the median segment, the femora, tibiæ, and tarsi of the anterior legs, the apex

of the femora, the tibiæ and tarsi of the intermediate and posterior legs above, and an irregularly waved subapical line dorsally and ventrally on segments 2–4 of the abdomen pale yellowish white; the base of the 1st segment broadly, and of the 2nd narrowly red; wings hyaline, nervures sordid yellow.

Hab. Tenasserim. ♀. *Length* 12; *exp.* 22 mm. Type in coll. British Museum.

534. **Philanthus avidus,** *Bingh. Jour. Linn. Soc.* 1896, p. 440.

♀. Head very closely and finely, thorax and the posterior margin of the basal abdominal segment more sparsely and coarsely punctured, the base of the 1st, the whole of the 2nd and following segments smooth, head about the width of the thorax; mesonotum strongly convex; median segment short, apex with a steep slope nearly truncate, a medial longitudinal broad but shallow furrow from base to apex of the segment, sides and apex with a thin soft pubescence; the tibiæ and tarsi spinose; posterior margin of the basal abdominal segment constricted, apical segment slightly pubescent. Black, the mandibles, except at apex, the clypeus, a moon-shaped spot above it, a spot on each side of the face above the base of the antennæ, the scape in front, the inner margin of the eyes, a line behind them, a line on the front of the pronotum, the tegulæ, the postscutellum, the tibiæ and tarsi of the legs above, a subapical spot on each side of the basal abdominal segment, and narrow subapical bands on the dorsal and ventral sides of segments 2–5 yellowish white; basal segment, except for a narrow black subapical border above, deep red; wings hyaline, faintly fuscous, and in certain lights iridescent.

Hab. Tenasserim. ♀. *Length* 10; *exp.* 16 mm.

535. **Philanthus elegans,** *Smith, A. M. N. H.* (4) xii, 1873, p. 415; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 248.

♀. Vertex of the head, mesonotum, scutellum, postscutellum, and abdomen coarsely and somewhat sparingly punctured, the abdomen more closely than the other parts; clypeus, front to a little above the base of the antennæ, pronotum, and median segment smooth, the punctures below the ocelli much finer and closer; clypeus strongly arched anteriorly, slightly convex; median segment short, shining, slightly compressed laterally, with a broad oval fovea at the apex above, the apex steep, almost truncate, variegated with white, black, and ferruginous; the base of the mandibles, the clypeus, the sides of the face to the emargination of the eyes, the scape, and the basal two joints of the flagellum of the antennæ in front, a kite-shaped mark beneath the anterior ocellus, a curved line on the occiput, the cheeks and back of the head, the pronotum, two medial longitudinal lines on the disc of the mesonotum, two broader stripes in front of the tegulæ, the tegulæ, a spot behind them, the scutellum, postscutellum, sides of the median segment broadly, pro- and mesopleuræ, legs, and large lateral spots on the basal four segments, with the whole of the 6th segment

of the abdomen yellowish white; the head above, a spot on the pronotum in front, the mesonotum, and the base and middle of the slope of the median segment black; the legs variegated with pale reddish, and the abdomen except the markings as above ferruginous, somewhat fuscous on the apical half above; wings hyaline, nervures ferruginous.

Hab. Northern India (*Smith*). ♀. *Length* 10; *exp.* 19 mm.

536. **Philanthus sulphureus,** *Smith, Cat.* iv, p. 469, ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 248.

♂. Head above the emargination of the eyes, mesonotum, scutellum, postscutellum, median segment on the sides and at apex, and the abdomen punctured, the punctures finer and closer on the head, coarser on the abdomen; clypeus and front of the face, the cheeks partially, the pronotum, the base of the median segment above, and the legs smooth and shining, anterior margin of clypeus arched and fringed with long stiff hairs; median segment with a fovea at base above, the apex truncate with a medial vertically-impressed line. Sulphur-yellow, the clypeus and front beneath and around the base of the antennæ, and the base of the mandibles white; a line round the upper part of the eyes, joined by a curved line over the posterior ocelli, and another on the occiput, the anterior, lateral, and apical margins of the mesonotum, a medial longitudinal black line over its disc, and a mark produced angularly back in the middle at the base of the median segment black, the apical eight joints of the antennæ, the apical margins of abdominal segments 1–3 and basal margin of the 4th obscurely ferruginous; legs yellow; wings hyaline, nervures and tegulæ yellow.

Hab. Northern India (*Smith*). ♂. *Length* 9; *exp.* 17 mm. ♀ unknown. Type in coll. British Museum.

537. **Philanthus concinnus,** *Bingh. Jour. Linn. Soc.* 1896, p. 442.

♀. Head and thorax finely and closely punctured, abdomen smooth but not shining; head somewhat broader than the thorax, obscurely subpubescent; clypeus carinate in the middle anteriorly, the apex projecting; mesonotum broad, convex; median segment rounded, with a somewhat steep slope posteriorly, and bearing a medial longitudinal fine furrow; legs stout, the tibiæ and tarsi of the intermediate and posterior legs thickly spinose; abdomen as long as the head and thorax united, the petiole constricted at apex; anal segment rounded at apex. Black, the base of the mandibles, the clypeus, a crescentic mark above it, the inner orbits, up to the emargination of the eyes, a spot on the scape in front, a narrow line sloping obliquely back behind the eyes, an abbreviated

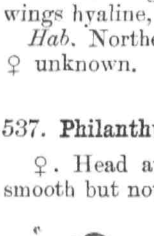

Fig. 84. *Philanthus concinnus*, ♀. $\frac{3}{1}$.

line, broadly interrupted in the middle, on the pronotum, a spot on the tegulæ in front, two minute obliquely placed spots in the middle of the postscutellum, an irregularly waved subapical line on the dorsal and ventral sides of abdominal segments 2–4, and a transverse spot at the apex of the 5th segment yellow; the line on the 2nd segment is narrowly interrupted in the middle, and the base of the same segment is red; legs variegated with yellow; wings light fusco-hyaline and iridescent, nervures and tegulæ testaceous. The fine rather thin pubescence on the head and on the sides of the median segment white.

Var. The yellow markings on the postscutellum and on the abdomen entirely or nearly obsolete.

Hab. Tenasserim. ♀. *Length* 11–12; *exp.* 22–24 mm. ♂ unknown. Type in coll. British Museum.

538. **Philanthus pulcherrimus**, *Smith, Cat.* iv, p. 469, ♀ ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 248.

♀. Head above the base of the antennæ, the mesonotum, mesopleuræ, and abdomen rather coarsely punctured, the punctures dense on the head, more distantly placed on the mesonotum, the pleuræ, and abdomen, becoming very sparse on the apical segments of the last; clypeus, the sides of the face as high as the base of the antennæ, the prothorax, the scutellum, postscutellum, and median segment smooth and shining; anterior margin of the clypeus widely triangular; median segment rounded posteriorly, with a deep broad fovea at apex above. Black; the face below the antennæ, the clypeus, base of the mandibles, scape and basal three joints of the flagellum of the antennæ, a coronet-shaped spot on the front, a line on the cheeks, a line on the pronotum, the tubercles, a spot at the base of the mesopleuræ, the scutellum, postscutellum, two large, oval, lateral spots on the 2nd abdominal segment, and a broad transverse band on the apical margin of the 4th segment yellowish white, a narrow line on the apical margin of the 5th and the 6th segments testaceous, the basal segment bright ferruginous; legs yellowish white, the coxæ, trochanters, and femora stained with dusky red; wings hyaline and iridescent, nervures and tegulæ yellow.

♂ similar, but the 5th and following abdominal segments black.

Hab. India (*Smith*). ♀. *Length* 8; *exp.* 14 mm. ♂. *Length* 6; *exp.* 11 mm. Type in coll. British Museum.

Genus **CERCERIS**.

Crabro, pt., *Oliv. Encycl. Méthod.* vi, p. 509 (1791).
Philanthus, pt., *Fabr. Ent. Syst.* ii, p. 288 (1793).
Cerceris, *Latr. Hist. Nat. Ins.* xiii, p. 315 (1805).

Type, *C. arenaria*, Linn.
Range. Both hemispheres.

Head as wide as the thorax or wider, broader than long, subquadrate in some species, seen from above; ocelli in a triangle on the vertex; eyes ovate, not reniform; antennæ very slightly clavate, inserted about the middle of the face or a little higher; mandibles stout, simple, unidentate or bidentate; thorax ovate, pronotum transverse; median segment roundly truncate, always with a larger or smaller triangular or cordate space at the base enclosed by convergent furrows; legs stout, and in both sexes strongly spinose, more spinose in the ♀ than in the ♂; anterior tarsi ciliated; intermediate tibiæ with one apical spur; posterior tibiæ with two. Wings long, ample; fore wing with one radial and three cubital cells, the radial cell oblong, the 1st cubital cell longer than the 2nd and 3rd united, the 2nd triangular, petiolate, receiving the 1st recurrent nervure about the middle, the 3rd cubital cell receives the 2nd recurrent nervure near its base. Abdomen oblong, subpetiolate, the petiole formed by the narrowing of the 1st segment, which is sometimes subglobular; the apical margins of the basal five (♀), or basal six (♂) segments strongly constricted, pygidial area with three planes bordered by carinæ, the three planes always more or less rugose.

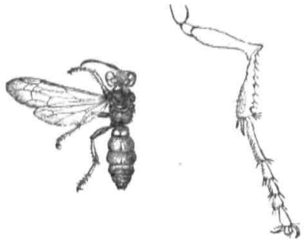

Fig. 85.—*Cerceris vigilans*, ♀. 1/1.

The fossorial wasps of this genus are predatory on beetles; the Indian species I have had an opportunity of observing always store *Chrysomelidæ* in their nests. *C. elizabethæ* I found carrying *Downesia brettinghami* to her nest. The nests that I have seen have always been dug in level ground, never on a bank-side, and the tunnels leading to them were from 6 to 12 inches deep.

Key to the Species.

A. Enclosed, triangular, or cordate space at base of median segment smooth.
- a. Abdomen with the basal segment red.
  - a'. Clypeus transverse anteriorly.
    - a^2. Clypeus transverse only in the middle at apex; not dentate .... *C. albopicta*, p. 301.
    - b^2. Clypeus transverse across the whole apical margin; dentate at the sides. *C. rothneyi*, p. 302.
  - b'. Clypeus emarginate anteriorly.
    - a^2. Colours reddish brown with a few black markings. L. ♀ 28–22 mm.. *C. orientalis*, p. 302.
    - b^2. Colours reddish brown with black and yellow markings. L. ♀ 10–12 mm...... .... *C. humbertiana*, p. 303.
  - c'. Clypeus arched anteriorly.
    - a^2. Mesosternum laterally dentate; clypeus not dentate .... *C. dentata*, p. 303.

b^2. Mesonotum not dentate; apical margin of clypeus with four teeth . . *C. tetradonta*, p. 304.

b. Abdomen with the basal segment black, or black variegated with yellow, not red.

a'. Clypeus transverse anteriorly . . . . *C. sulphurea* ♀, p. 305.

b'. Clypeus arched anteriorly . . . . *C. pictiventris*, p. 305.

c. Abdomen with the basal segment yellow, or yellow with very narrow black markings.

a'. Clypeus porrect, its anterior margin transverse . . . . *C. flavopicta*, p. 306.

b'. Clypeus not porrect, its anterior margin deeply incised . . . . *C. wroughtoni*, p. 306.

B. Enclosed triangular or cordate space at base of median segment punctured.

a. Abdomen with the basal segment red.

a'. Clypeus emarginate anteriorly.

a^2. Apical margin of clypeus with two teeth . . . . *C. instabilis* ♂, p. 307.

b^2. Apical margin of clypeus not dentate. *C. pulchra*, p. 308.

b'. Clypeus truncate anteriorly . . . . *C. vishnu*, p. 308.

c'. Clypeus arched anteriorly . . . . *C. vigilans*, p. 308.

b. Abdomen with the basal segment black, or black variegated with yellow.

a'. Clypeus emarginate anteriorly . . . . *C. tristis*, p. 309.

b'. Clypeus arched anteriorly . . . . *C. sulphurea* ♂, p. 305.

C. Enclosed, triangular, or cordate space at base of median segment striate.

a. Enclosed space longitudinally striate.

a'. Head extraordinarily large, much broader than the thorax . . . . *C. ferox*, p. 309.

b'. Head not extraordinarily large, not or little broader than the thorax.

a^2. Median segment posteriorly red, the enclosed space black . . . . *C. mastogaster*, p. 310.

b^2. Median segment posteriorly red, marked with yellow, the enclosed space black . . . . *C. instabilis* ♀, p. 307.

c^2. Median segment black immaculate.

Length ♀ 10 mm. . . . . *C. unifasciata*, p. 310.

Length ♀ 15 mm. . . . . *C. nebulosa*, p. 311.

d^2. Median segment posteriorly black, marked with yellow . . . . *C. hilaris*, p. 311.

e^2. Median segment posteriorly entirely fulvous . . . . *C. bifasciata*, p. 312.

b. Enclosed space obliquely striate.

a'. Mesosternum laterally dentate . . . . . . *C. elizabethæ*, p. 312.

b'. Mesosternum not dentate . . . . *C. pentadonta*, p. 312.

c. Enclosed space transversely striate . . . . . . *C. kirbyi*, p. 313.

539. **Cerceris albopicta,** *Smith, A. M. N. H.* (4) xii, 1873, p. 412; *Schlett. Zool. Jahrb.* 1887, p. 485; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 248.

♀. Head, thorax, and abdomen closely and finely punctured; the clypeus broad, flat, transverse anteriorly in the middle, the sides oblique, antennal carina short, broadening below; the

enclosed space at the base of the median segment small, smooth, shining, a single row of punctures along its sides; a medial slight groove ending beyond the apex in a small depression, beyond which again the furrow is continued to the apex of the segment; abdomen longer than the head and thorax united. Black, the clypeus and face below the base of the antennæ, the scape of the latter, the antennal carina, a spot behind the eyes (sometimes absent), the pronotum posteriorly, the tegulæ, a curved medially interrupted line on the scutellum, a transverse line on the post-scutellum, two spots, one above the other, on the mesopleuræ, a spot at the base (sometimes absent) and two apical lateral spots on the 2nd abdominal segment, and the whole 3rd and 5th segments above white, the white on the 3rd and 5th segments emarginate anteriorly; basal two segments of the abdomen red; flagellum fulvous; legs white, the intermediate and posterior femora and tibiæ more or less stained with chestnut-red; wings hyaline, fuscescent at apex.

Hab. Bombay. ♀. *Length* 10–11; *exp.* 19 mm.

540. **Cerceris rothneyi**, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, pp. 250 & 251.

♀. Clypeus and front punctured, the punctures very shallow; the clypeus anteriorly transverse, with a minute tooth at the base of the mandible on each side; head above and mesonotum closely and finely punctured; pronotum, scutellum, postscutellum, median segment, and abdomen finely but not so closely punctured; the triangular enclosed space at base of median segment smooth and shining, medially furrowed, the furrow continued to the apex of the segment. Variegated with black, yellow, and ferruginous; the base of the mandibles, the clypeus and face in front, as high as halfway between the base of the antennæ and the anterior ocellus, the scape, the tegulæ, the middle of the scutellum and post-scutellum, the base of the 2nd, the 3rd, and 5th segments of the abdomen above, yellow; the vertex of the head, the cheeks, and the 4th and 6th abdominal segments black, the rest of the thorax and abdomen ferruginous or chestnut-red; legs yellow, the femora above stained with dark red; wings hyaline, the apex of the fore wing fuscous.

Hab. Barrackpore, Bengal. ♀. *Length* 10; *exp.* 20 mm. Type in coll. Rothney.

541. **Cerceris orientalis**, *Smith, Cat.* p. 454, ♀ ♂; *Schlett. Zool. Jahrb.* 1887, p. 498; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, pp. 250 & 265, pl. x, fig. 14.

♀. Head, thorax, and abdomen strongly but not very closely punctured; clypeus porrect, the apex roundly emarginate, beneath with a fringe of long stiff hairs, the sides of the face and front, and the cheeks, pilose; the front from below the anterior ocellus to the base of the clypeus with a wide well-marked carina; median segment with a small enclosed space at base smooth, divided by a

medial furrow which is continued down the truncated posterior face of the segment to the apex, the sides of the median segment with long soft pubescence; abdomen longer than the head and thorax united. Reddish brown, the region of the ocelli and transverse narrow bands at the base of abdominal segments 2–5 black, the pile on the face silvery, the pubescence on the median segment white; wings flavo-hyaline, apical margin of the fore and apex of hind wing fuscous.

♂ similar, slightly smaller, with fuscous marks on the thorax.

Hab. North-West Provinces; Barrackpore; Madras. ♀. *Length* 18–22; *exp.* 36–44 mm.

542. **Cerceris humbertiana.**

? Philanthus interstinctus, *Fabr. Ent. Syst. Suppl.* p. 269.
? Cerceris interstincta, *Smith, Cat.* iv, p. 452.
Cerceris humbertiana, *Sauss. Novara-Reise, Hym.* p. 97, ♀; *Schlett. Zool. Jahrb.* 1887, p. 494; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 249.
Cerceris emortualis, *Sauss. Novara-Reise, Hym.* p. 98.
Cerceris viscosus, *Smith, Tr. Ent. Soc.* 1875, p. 40, ♀.
Cerceris rufinodis, *Smith, Tr. Ent. Soc.* 1875, p. 41, ♂.

♀. Head, thorax, and abdomen closely and not very finely punctured, lamina of clypeus porrect, the apex very slightly emarginate; antennal carina short, pyramidal in form; median segment with triangular enclosed space at base smooth and shining, a very short but deep longitudinal furrow at its apex, the furrow not continued to the apex of the segment; abdomen somewhat longer than the head and thorax united. Reddish brown; mandibles at base, clypeus, front to a little above the base of the antennæ, the scape of the latter, the antennal carina, a small spot above it, the cheeks, the posterior margin of the pronotum, a spot on the tegulæ, a spot on the mesopleuræ, another below it on the mesosternum, a small spot at the lateral angles of the scutellum, a line on the postscutellum, a broad elongate mark on the sides of the median segment, and large semicircular spots on the apical margins of abdominal segments 2–4, with the whole of the 5th segment above bright yellow; an elongate spot on the front above the clypeus reaching a little beyond the ocellus, and the bases narrowly of the 2nd and following segments of the abdomen black; wings hyaline, the stigma and apex of fore wing fuscous.

♂ similar in shape of the yellow markings, but black, with the basal segment red. In both sexes the legs are yellow, variegated with chestnut-red in the female, black in the male.

Hab. Barrackpore, Bengal; Ceylon. ♀. *Length* 10–12; *exp.* 19–22 mm. ♂. *Length* 9–10; *exp.* 15–19 mm.

543. **Cerceris dentata,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, pp. 248 & 260, pl. x, fig. 10.

♀. Clypeus broad, depressed, smooth, arched anteriorly; the head above, thorax, and abdomen coarsely punctured, the meso-

sternum laterally with two teeth; the enclosed space at the base of the median segment smooth and shining, with only one or two large punctures, medially divided by a fine furrow, which is continued to the apex of the segment. Black; the base of the mandibles, clypeus, sides of the face broadly, not reaching the vertex, a small balloon-shaped mark above the base of the antennæ, a diagonal spot behind the eyes on each side of the vertex, the posterior margin of the pronotum, the tegulæ, the tubercles, a spot round the lateral mesosternal teeth, two large spots on the scutellum, a line on the postscutellum, a large oval spot on each side posteriorly of the median segment, two minute spots above on the basal, and transverse bands on the apical margins of the 2nd, 3rd, and 5th abdominal segments, yellow; the flagellum of the antennæ, femora and tibiæ of the legs above, and basal abdominal segment ferruginous, the femora and tibiæ beneath and the tarsi yellow; wings hyaline, apex of fore wing with a light fuscous spot, nervures testaceous.

Hab. Barrackpore, Bengal; Poona, Bombay. ♀. *Length* 8–9; *exp.* 16–17 mm. ♂ unknown. Type in coll. Rothney.

*544. **Cerceris tetradonta,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, pp. 250, 261, pl. x, fig. 12.

♀. "Black, closely and rather strongly punctured; the clypeus, the cheeks broadly from near to the top of the antennal ridge, scape beneath the base of the mandibles, two small spots behind the ocelli, a large line behind the eyes, a broad line on the side of the pronotum, a mark on the side of the scutellum, metanotum, two large marks on the side of the median segment, tegulæ, tubercles, a small spot below them, the sides of the petiole, and a short line on the edges of the other segments, and on the edges of the 3–5 ventral segments, whitish yellow . . . . Flagellum rufous beneath, fuscous above, the 3rd and 4th joints subequal. Clypeus flat, the apex projecting and armed with four stout blunt teeth. Pronotum rounded at the sides and with an oblique slope in front. Mesopleural furrow indistinct. Trigonal area smooth, impunctate, shining, the central furrow narrow; metapleuræ at base strongly striolated, black above, the rest reddish, the extreme apex of the median segment being also reddish. Petiole rufous, broader than long, the base oblique . . . . The basal ventral segment is entirely rufous, the others are broadly rufous in the middle. Wings almost hyaline, the apex infuscated . . . . Legs rufous in front, more or less whitish yellow beneath, the hind tibiæ fuscous behind, the hind tarsi for the greater part fuscous.

"The ♂ is smaller and similarly coloured, but with the yellow marks more reduced, the clypeus slightly convex, the apex transverse except that a short not very distinct tooth projects in the middle. The femora are broadly lined with black laterally and above, especially the anterior four.

"*Hab.* Poona, Bombay Presidency. ♀. *Length* 6–7 mm."

545. **Cerceris sulphurea,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, pp. 250, 261, pl. x, fig. 11.

♀. Clypeus porrect, the apex transverse, the antennal carina broad beneath, running into a sharp edge at top; vertex of the head closely punctured; the front, thorax, and abdomen more sparsely punctured; the enclosed triangular space at the base of the median segment smooth and shining; abdomen about as long as head and thorax united. Black; the base of the mandibles, the clypeus and face to a little above the base of the antennæ, the antennal carina, the cheeks behind the eyes, the pronotum, scutellum, postscutellum, a large oval spot on each side of the median segment, the mesopleuræ, and large lunate spots on both sides of the apical margins of abdominal segments 1–5, bright yellow; the legs yellow, marked with ferruginous; the apical segment of the abdomen ferruginous; the flagellum of the antennæ fulvous; wings hyaline, the apex of the fore wing fuscous.

♂ similar, but with the trigonal area at base of median segment punctured, and the mesonotum marked with rufous.

Hab. Bombay. ♀ ♂. *Length* 8; *exp.* 16 mm. Type in coll. Rothney.

546. **Cerceris pictiventris,** *Dahlb. Hym. Eur.* i, p. 498.
Cerceris novaræ, *Sauss. Novara-Reise, Hym.* p. 92, pl. iv, fig. 54.
Cerceris fervens, *Smith, A. M. N. H.* (4) xii, 1873, p. 411.

♀. Head, thorax, and abdomen closely and coarsely punctured, the punctures on the clypeus and face below the base of the antennæ not so deep or close as on the head above; clypeus broad, flat, broadly rounded anteriorly, the lateral angles somewhat produced; antennal carina short; a space round the base of each antenna hollow and smooth; median segment with the enclosed space at base small, triangular, smooth, medially furrowed; the apex of the enclosure and the furrow, which is continued down to the apex of the segment, transversely striate. Black; the base of the mandibles, the clypeus, the inner orbits of the eyes broadly to above the base of the antennæ, the antennal carina, the lateral angles of the pronotum, a spot on each of the mesopleuræ below, the outer margins of the tegulæ, a line on the scutellum, the post-scutellum, the posterior lateral angles of the median segment, the base of the 2nd abdominal segment, and broad anteriorly emarginate transverse bands on the 3rd and 5th segments, yellow; legs yellow, the posterior femora and the apices of the posterior tibiæ on the inside rufo-fuscous; wings hyaline, the narrow costal margin of the fore wing and the apex fuscescent.

♂ similar, but the yellow markings not so broad or vivid; the anterior and intermediate femora at base and the entire posterior femora black.

Var. The clypeus in the centre and the scutellum black. ♂. The apical margin of the 6th abdominal segment with a transverse yellow band.

Hab. Throughout India, Ceylon, Burma, and Tenasserim. Common. ♀. *Length* 9–11; *exp.* 18–22 mm. ♂. *Length* 8–10; *exp.* 17–20 mm.

547. **Cerceris flavopicta,** *Smith, Cat.* iv, p. 451, ♂ ♀; *Schlett. Zool. Jahrb.* 1887, p. 492; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 249.

♀. Head, thorax, and abdomen rather sparsely and coarsely punctured, on the vertex of the head and the basal portions of the abdominal segments the punctures are somewhat closer; clypeus porrect, its anterior margin transverse; median segment with the enclosed space at base smooth and shining, not divided by the usual medial furrow, which runs from the apex of the enclosed space only to the apex of the segment. Yellow; the vertex of the head, with a stripe leading to the base of each antenna, a broad curved stripe on the occiput, the mesonotum, the enclosed space at the base of the median segment, a broad medial stripe down to the apex of the latter, the metapleuræ, and the base and apical margin very narrowly of abdominal segments 1–5 black, the black at the base and apex of each segment connected by a broad black medial stripe narrowing posteriorly; the flagellum of the antennæ fulvous, the intermediate femora and tibiæ with reddish stains above; wings hyaline, the apex broadly fuscous; nervures pale testaceous, tegulæ yellow.

♂ similar, but the clypeus not porrect, and the medial stripes on the abdominal segments very narrow, obsolete on the 5th segment.

Hab. North-West Provinces; Barrackpore; Tirboot; Madras; Assam. ♀ ♂. *Length* 9–11; *exp.* 18–20 mm. Type in coll. British Museum.

*548. **Cerceris wroughtoni,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 258.

♀. "Black, shining, thorax and head punctured, the abdomen impunctate, smooth; the clypeus, the cheeks to above the base of the antennæ, the antennal ridge, the scape beneath, a large broad line behind the eyes, a line on the pronotum, scutellum, metanotum, two small marks on the middle of the median segment, the petiole except a broad stripe down the centre, the base of the second and third segments all round, the edge of the fourth and a large mark in its centre, a similar mark on the fifth, and the basal three ventral segments for the greater part, clear yellow; the flagellum beneath and a large mark on either side of the median segment rufo-fulvous; legs fulvous, the anterior four in front and the hinder femora in part pale yellow. Wings fuscous, the apex much darker; the stigma fulvous . . . Clypeus flat, the apex black, roundly and broadly incised, its sides and the cheeks bearing a silvery pubescence. . . . . The pubescence on the head is longish and pale, the punctuation moderately strong, and all the punctures deeply separated. Thorax moderately strongly punctured, covered with a pale pubescence

. . . scutellum sparsely punctured, trigonal area smooth, impunctate, furrowed down the middle . . . Petiole wider than long, bulging out in the centre, sparsely and finely punctured, the fifth segment also sparsely punctured, the others with the surface aciculate. . . . Hinder tibiæ very stoutly and closely spined. The male has the face from the top of the antennal ridge entirely yellow; the clypeus flattish, the apex rounded, almost transverse, the lateral plates incised, there is a small yellow mark below the tubercles, there are two large yellow marks on the median segment; the 4th segment is almost entirely yellow, the 5th has a narrow yellow border on the apex, the 6th is almost entirely yellow, the sides of the apical segment are yellow; the legs are clear yellow; the hinder femora are marked with black, the hind tibiæ are broadly black at the apex, and the hind tarsi are fuscous; otherwise coloured as in the ♀ . . . *Length* 11 mm."

Hab. Bombay. I have not seen this species.

549. **Cerceris instabilis**, *Smith, Cat.* iv, p. 452, ♀; *Schlett. Zool. Jahrb.* 1887, p. 494; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 249.
Cerceris velox, *Smith, Tr. Ent. Soc.* 1875, p. 41, ♂.

♀ ♂. Head, thorax, and abdomen closely punctured; clypeus broad, incised in the middle, with two prominent but obtuse teeth; median segment with the enclosed triangular space at base equilateral, longitudinally striate in the ♀, punctured in the ♂, basal abdominal segment particularly slender and long. Reddish brown: the region of the ocelli, with a broad patch below stretching laterally to the eyes and downwards to the base of the antennæ, the pronotum in front, the triangular enclosed space at the base of the median segment, a medial narrow line down to the apex of the latter, and the bases of abdominal segments 2–5 narrowly, black; the clypeus, face in front, antennæ, and legs more or less fulvous; the posterior margin of the pronotum, the scutellum and postscutellum, a curled comma-shaped spot on each side of the apex of the median segment, a subbasal spot on the 2nd abdominal segment above, and the posterior margins of the 3rd and 5th segments broadly, yellow; wings hyaline, their apical margins broadly fuscous.

Fig. 86.—*Cerceris instabilis*, ♀. $\frac{2}{1}$.

Var. α. The front above the antennæ, the vertex and occiput black, the last with a curved brownish-red transverse stripe.

Var. β. Similar to *Var. α*, but with no yellow spots on the median segment; the clypeus and face below the antennæ, and scape of the latter bright yellow.

Var. γ. The head and thorax black, with the yellow markings as in the type.

Var. δ. Very much larger; head and thorax black; yellow markings as in the type, with the addition of a broad curved

transverse stripe on the occiput, and a geniculated stripe behind the eyes yellow. (*Length* 14 mm.)

Hab. Throughout the plains of India; Bombay; Bangalore; Madras; Burma; Tenasserim; Ceylon. ♀ ♂. *Length* 9–11; *exp.* 18–21 mm.

550. **Cerceris pulchra,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, pp. 250, 253, pl. x, fig. 5.
?Philanthus dissectus, *Fabr. Ent. Syst. Suppl.* p. 269.

♀ ♂. Closely resembling in colour and markings *C. albopicta* (p. 301); but constantly smaller, with the parts which in the latter species are white a rich golden yellow; also the spots behind the eyes, on the mesopleuræ, and on the lateral apical margins of the 2nd abdominal segment wanting, as well as the line on the scutellum; the clypeus is angularly incised in the middle; and the enclosed space at the base of the median segment is punctured, not smooth.

This species may be the *Philanthus dissectus* of Fabricius, which I have wholly failed to identify.

Hab. Sikhim; Barrackpore; North-West Provinces; Bombay. ♀ ♂. *Length* 7–8; *exp.* 14 mm.

551. **Cerceris vishnu,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, pp. 250, 254, ♀ ♂, pl. x, fig. 7*.

♀. Lamina of clypeus projecting, incised anteriorly; head and thorax rugose, punctured; the enclosed space at the base of the median segment nearly obsolete, coarsely punctured like the rest of the segment; basal segment of abdomen a little longer than broad. Black; the clypeus anteriorly, the antennal carina, the scape of the antennæ, a spot on each cheek, a small mark on each side of the pronotum, the posterior margins of the 3rd and of the 5th abdominal segment in the middle, the anterior and intermediate tibiæ in front, and the bases of the posterior tibiæ yellow; the femora beneath, the posterior coxæ, the basal abdominal segment entirely and the basal half of the 2nd segment rufo-ferruginous; wings hyaline, apex of fore wing fuscous.

♂ similar, but the clypeus truncate not incised, basal abdominal segment entirely and the basal half of 2nd segment black, and the posterior margin of the 6th segment yellow.

Hab. Barrackpore; Bombay. ♀. *Length* 8–9; *exp.* 14 mm. ♂ a little smaller.

552. **Cerceris vigilans,** *Smith, Cat.* iv, p. 454, ♂; *Schlett. Zool. Jahrb.* 1887, p. 506; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 250.

♀. Clypeus and front to a little above the base of the antennæ smooth, with only a few scattered punctures; head above, the thorax, and abdomen closely and somewhat coarsely punctured; clypeus large, broadly arched anteriorly, the apex slightly produced and armed with three broad teeth; antennal carina short and broad; median segment with the enclosed space at base bounded by converging furrows, continued after their junction as one broad

vertical furrow to the apex of the segment, the enclosed space shining, more sparsely punctured and divided by a medial, longitudinal, short groove; abdomen a little longer than the head and thorax united. Black, covered all over with a thin hoary pubescence; a broad line on each side of the face along the inner orbits to a little above the base of the antennæ, a medial line from the anterior ocellus broadening on the clypeus, a spot on each cheek close to the vertex, a spot on each side of the pronotum, the tibiæ and basal joints of the tarsi of all the legs above, and two approximate cup-shaped marks at the apex of the basal segment of the abdomen above, yellowish white; abdominal segments 2–4 ferruginous red, the 4th shaded with fuscous black; wings dark fuscous with a purple effulgence.

♂ similar, but the antennæ ferruginous beneath.

Hab. Kumaun; Barrackpore; Bombay; Madras; Burma; Tenasserim. ♀. *Length* 12–15; *exp.* 24–30 mm. ♂. *Length* 9–12; *exp.* 19–25 mm.

553. **Cerceris tristis,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, pp. 250, 255, pl. x, fig. 7.

♀ ♂. Closely allied to and resembling *C. pictiventris*; differs in the antennæ being inserted comparatively higher up on the front, in the clypeus (♂) being subporrect and incised at apex, in the triangular enclosed space at the base of the median segment being punctured, not smooth, and also in this segment wanting the posterior lateral spots so conspicuous in *C. pictiventris*.

Hab. Barrackpore, Tirhoot. ♀ ♂. *Length* 7–9; *exp.* 14–17 mm.

554. **Cerceris ferox,** *Smith, Cat.* iv, p. 454, ♀; *Schlett. Zool. Jahrb.* 1887, p. 491; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 248.

♀. Head from the front very short and broad; eyes slightly convergent towards the vertex; clypeus deeply and very broadly emarginate anteriorly: the front above the base of the antennæ, the thorax, and basal segment of abdomen very closely and finely punctured, the 2nd and following abdominal segments lightly punctured, smooth but opaque; a very fine obscure carina down the front, joining the carina between the antennæ, which is prominent; the enclosed space at base of median segment small, longitudinally and finely striate. Black; the carina above the clypeus, the face on both sides, and the sides of the clypeus, the mandibles at base, the scape of the antennæ, an ovate spot behind each eye, two oblong spots placed obliquely on the vertex, a spot on each side of the pronotum, another beneath the wings, the margins of the tegulæ, the scutellum, postscutellum, a spot on each side of the median segment posteriorly, two minute subapical spots above on the 1st abdominal segment, two on the base of the 2nd, and subapical bands on segments 2–5 yellow, the bands on segments 2–4

Fig. 87.—*Cerceris ferox*, ♀. 1/1.

widening laterally; legs yellow, a fuscous stripe on each femur above and each of the intermediate and posterior tibiæ behind; the apical joints of the tarsi ferruginous; wings fusco-hyaline, darkest towards the costal margin and the apex of the fore wing.

Var. wanting the oblique yellow spots on the vertex, the spot beneath the wings, and the subapical spots on the basal abdominal segment; scutellum and posterior legs black.

Hab. Tenasserim; Sumatra. ♀. *Length* 11–14; *exp.* 20–24 mm. ♂ unknown.

555. **Cerceris mastogaster,** *Smith, Cat.* iv, p. 453, ♀; *Schlett. Zool. Jahrb.* 1887, p. 496; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 249.

♀. Head thinly pubescent; head, thorax, and abdomen coarsely and closely punctured, the clypeus and front beneath the antennæ and the postscutellum with the punctures sparser; clypeus with its anterior margin very slightly emarginate, almost transverse; enclosed triangular space at base of median segment smooth and shining, the base longitudinally striate; a series of single punctures along the other two sides of the triangle; the medial furrow narrow, broadening beyond the apex of the triangle and continued to the apex of the segment; abdomen with ventral segments 3–5 having laterally small erect plates, concave within. Head and thorax black; the base of the mandibles, the clypeus, the front up to the base of the antennæ, the scape in front, the antennal carina, the lateral angles of the pronotum, the tegulæ, postscutellum, tibiæ and tarsi of the legs white; the sides of the median segment red; abdomen red, two small spots at the base of the 2nd abdominal segment, two large spots covering the sides of the 3rd, and meeting in a thin line along the margin, and two subtriangular spots laterally on the 5th segment white; the 4th segment laterally, the 5th at its base above, and the apical segment black; wings hyaline, fore wing with a fuscous spot at apex.

Hab. Madras. ♀. *Length* 15; *exp.* 27 mm. ♂ unknown. Type in coll. British Museum.

556. **Cerceris unifasciata,** *Smith, Cat.* iv, p. 456, ♂ (*nec* ♀); *Schlett. Zool. Jahrb.* 1887, p. 505.

♂. Head, thorax, and abdomen closely and rather coarsely punctured; the clypeus convex, its anterior margin rounded; antennal carina short, scarcely produced above the base of the antennæ; the enclosed space at the base of the median segment longitudinally striate. Black; the face below the antennæ, scape in front, mandibles, an obscure line on each lateral angle of the pronotum, a spot on each tegula, one on the postscutellum, a spot on each side at the apex of the median segment, the anterior and intermediate tibiæ and tarsi, a broad band on the apical margin of the 3rd abdominal segment, and the apical margins of ventral segments 2–5, yellow; the apex of the coxæ, the trochanters and tips of the

femora, and the apical margins of abdominal segments 2–5 above narrowly flavo-testaceous; the flagellum of the antennæ fulvous beneath.

♀ similar, but the 2nd abdominal segment has two spots at its base, and the 4th and 5th as well as the 3rd segment a broad band of yellow on their apical margins.

Var. The band on the 4th abdominal segment reduced to a fine line; the spots at the apex of the median segment absent.

Hab. Sikhim; Upper Burma; Siam frontier of Burma; China. ♀. *Length* 11–12; *exp.* 20–23 mm. ♂. *Length* 8–9; *exp.* 16–19 mm.

Note.—The type specimen in the British Museum is a male, though described by Smith in the Catalogue as a female.

*557. **Cerceris nebulosa,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, pp. 250, 265.

"Eyes slightly diverging beneath. Ocelli hardly forming a triangle. . . . . . Clypeus flat, the middle at the apex turned outwardly, widely semi-circularly incised and separated from the lateral pieces by projecting beyond them. Head closely rugosely punctured; the cheeks and lateral margins of the clypeus densely covered with silvery white hair. Mesonotum closely and finely, longitudinally, rugosely punctured; the pleuræ coarsely rugose; trigonal area finely rugose. Abdomen twice the length of the thorax and narrower than it; the petiole not much broader than long; the punctuation of the segments not very strong; the pygidial area closely rugose, hardly narrowed at the base; the apex transverse. . . . . . The third joint of the antennæ longer and thinner than the fourth. The cheeks, clypeus, orbits broadly above the base of the antennæ, a spot behind the eyes near the top, a band on the pronotum, scutellum, postscutellum, a narrow band on the base of the 2nd abdominal segment, the extreme apex of the petiole, the apical half of the 3rd segment, and the extreme apex of the 4th, reddish fulvous. Legs black; the anterior tibiæ and tarsi obscure testaceous in front. *Length* 15 mm.

"*Hab.* North Khási Hills, Assam."

558. **Cerceris hilaris,** *Smith, Cat.* iv, p. 452, ♀; *Schlett. Zool. Jahrb.* 1887, p. 493; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 249.

♀ ♂. Head above, thorax, and abdomen more or less closely and not very finely punctured; clypeus porrect, deeply incised anteriorly; median segment rather more finely punctured, an enclosed equilaterally triangular space at base finely longitudinally striate, a deep narrow furrow from the apex of the enclosure to the apex of the segment; abdomen long, a little longer than the head and thorax united. Black; the base of the mandibles, a transverse spot on the clypeus, the inner orbits to a little above the base of the antennæ, the scape in front, a spot on each side of the vertex behind the eyes, the pronotum posteriorly, a line on the scutellum

and postscutellum, a large oval spot on each side of the median segment, and transverse bands on the posterior margins of abdominal segments 1–5 yellow, the bands on the 1st bordered posteriorly and on the 2–5 anteriorly with ferruginous; legs ferruginous; wings hyaline, shaded with fuscous, especially on their apical half; nervures testaceous, tegulæ yellow.

Hab. Northern India (*Smith*); Madras. ♀. *Length* 11–13; *exp.* 23–24 mm. ♂. *Length* 10–11; *exp.* 22–23 mm.

*559. **Cerceris bifasciata**, *Guér. Iconog. Règn. Anim.* p. 443, pl. 71, fig. 9; *Schlett. Zool. Jahrb.* 1887, p. 487; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 248.

♀ (?). "Entirely fulvous, punctured, the front of the head below the insertion of the antennæ, the scape of the latter, the base of the mandibles, the 3rd and 5th abdominal segments yellow. Wings with a yellow tint, a small brown spot at apex. *Length* 5 mm."

Hab. Bengal. I have failed to identify this species in any collection I have examined.

560. **Cerceris elizabethæ**, n. sp. (Pl. II, fig. 8.)

♀. Head, thorax, and abdomen coarsely cribrately punctured, the punctures shallow on the front and clypeus; clypeus with the lamina porrect, its anterior margin transverse; median segment with the enclosed space at base broadly triangular and obliquely striate, the medial furrow indistinct, the mesosternum beneath with two well-marked tubercular short spines; the basal segment of the abdomen slender, subcylindrical, and constricted at its apical margin. Black; the base of the mandibles and an abbreviated line along the inner orbits yellow; basal abdominal segment entirely and basal half of 2nd segment red; antennæ, the tibiæ and tarsi of the legs, and the extreme apex of the abdomen rufo-testaceous; wings hyaline, fuscescent along the costal margin and at apex of the fore wing; nervures testaceous, tegulæ black.

Hab. Thaungyin Valley, Tenasserim, extending into Siam. ♀. *Length* 11; *exp.* 20 mm. ♂ unknown. Type in coll. British Museum.

561. **Cerceris pentadonta**, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, pp. 250 & 262, pl. x, fig. 13.

♀. Clypeus and the front of the face, the pronotum and scutellum smooth with a few scattered punctures, the head above, mesonotum, median segment, and abdomen rather closely punctured; clypeus subporrect, the apex slightly produced and incised, and bearing five teeth; median segment with the enclosed space at its base small, very finely obliquely striate, and obscurely channelled down the middle, the channel continued as a broad furrow beyond the apex of the enclosed space to the apex of the

segment; abdomen long, longer than the head and thorax united. Black; a broad short line along the lower part of the inner orbits, the antennal carina, posterior margin of the pronotum, the postscutellum, and the 3rd abdominal segment and apical margin of the 5th orange-yellow; flagellum of the antennæ beneath fulvous; wings fusco-hyaline, darker along the costal margin of the fore wing; nervures blackish brown, tegulæ black, with the outer margin yellow.

Hab. Barrackpore. ♀. *Length* 8; *exp.* 19 mm. ♂ unknown. Type in coll. Rothney.

562. **Cerceris kirbyi**, n. sp.

♀. Front and vertex of the head strongly punctured, thorax and abdomen smooth, the surface of the mesonotum and the basal abdominal segments finely longitudinally aciculate; clypeus subtriangular, broad, convex at base, with a subapical transverse depression, the anterior margin arched and narrowly reversed; antennal carina rising from a tubercular prominence below the base of the antennæ; median segment with the enclosed space at base smooth or only obsoletely transversely striate, a medial furrow commencing at the apex of the enclosure and running to the apex of the segment; abdomen with the basal segment long, flattened, forming a marked petiole. Dark shining brown; the clypeus and front with silvery pile seen only in certain lights; clypeus, the sides of the face, the antennal carina, a transverse line on the occiput continued more broadly over the cheeks, the posterior margin of the pronotum, the tubercles, tegulæ, two spots on the disc of the mesonotum near its apex, a spot on the mesopleuræ, another below it on the mesosternum, the scutellum, postscutellum, sides of the median segment, base and apex of the petiole, basal half of the 2nd abdominal segment, the 3rd segment above, the apical margin of the 4th and more broadly of the 5th segment, pale straw-yellow; the 3rd segment with a transverse oval brown spot at base; apical segment rufo-testaceous; legs yellow, the anterior and intermediate coxæ and femora at base above, the posterior coxæ beneath, and the femora and tibiæ above, with the tarsi, brown; wings hyaline, beautifully iridescent, the costal margin narrowly and the stigma and apex of the fore wing fuscescent, nervures brown; flagellum of the antennæ dark reddish brown.

Hab. Tenasserim. ♀. *Length* 8; *exp.* 14 mm. ♂ unknown. Type in coll. British Museum.

This pretty and very distinct little species bears a curious resemblance to the savage little social wasp, *Icaria flavopicta*, Smith.

incised, lateral margins not curved upwards; median segment below the mucro shining, widely reticulate, with an inner and outer carina on each side all converging towards the apex, which is deeply longitudinally furrowed. Black; the clypeus, front, and cheeks with silvery pubescence; the posterior margin of the pronotum, a spot on the lateral angles of the scutellum, the squamæ, and an elongate spot widest in the middle on each side of the basal four abdominal segments above, ivory-white; base of the mandibles, antennæ, apex of the mucro, anterior and intermediate femora, tibiæ and tarsi, and posterior femora ferruginous; the antennæ and the outside of the intermediate tibiæ shaded with fuscous; wings hyaline, nervures and tegulæ pale testaceous.

Hab. Poona, Bombay. ♀. *Length* 9; *exp.* 17 mm. ♂ unknown. Type in coll. Rothney.

565. **Oxybelus sabulosus**, *Smith, Cat.* iv, p. 388, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 276.

♀. Closely resembles *O. agilis.* Differs in the clypeus being broadly not narrowly keeled, the keel not produced, the anterior margin waved; the scutellar squama transparent with a stripe of yellow, the mucro broader; the markings larger, bright yellow not yellowish white; the apex of the femora and the tibiæ of the anterior and intermediate legs and the basal half of the tibiæ of the posterior legs bright yellow, the basal and apical two joints of the flagellum of the antennæ and the tarsi ferruginous.

Hab. India (*Smith*). ♀. *Length* 6; *exp.* 12 mm.

566. **Oxybelus agilis**, *Smith, Cat.* iv, p. 387, ♂; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 275.

♂. Head, thorax, and abdomen finely and closely punctured; scutellum large, prominent, the punctures on it larger and more scattered; clypeus with a prominent narrow shining keel down the middle, the apex of the keel produced and curved over the apical margin of the clypeus; the scutellum and postscutellum with a medial longitudinal carina, the scutellar squama large, curved on the outside, the mucro at base of median segment narrow, concave, the sides recurved, the apex slightly incised; median segment beneath coarsely reticulate, with an inner and outer carina on each side all converging towards the apex of the segment. Black; the clypeus and cheeks with silvery pubescence, a medially interrupted line on the pronotum, the tubercles, the scutellar squamæ, the anterior and intermediate femora beneath, the extreme bases of the posterior tibiæ above, and medially interrupted subapical lines on abdominal segments 1–5 above, yellowish white; the flagellum of the antennæ, the anterior and intermediate tibiæ and tarsi, and the posterior tarsi ferruginous; wings hyaline, nervures testaceous.

Hab. India (*Smith*). ♂. *Length* 7; *exp.* 12 mm.

567. **Oxybelus tridentatus**, *Smith, Cat.* iv, p. 387, ♂ ; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 276.

♂. Head, thorax, and abdomen punctured, the punctures dense, not very fine on the head and thorax, more minute on the abdomen; clypeus with its anterior margin produced into three prominent teeth; mesonotum, scutellum, and postscutellum with a medial longitudinal carina not quite reaching the anterior margin of the mesonotum; squamæ transparent on the outer half, mucro at base of median segment arched upwards, concave, the sides recurved, the apex rounded; median segment beneath very smooth and shining in the middle, pubescent and obliquely striate on the sides. Black; the scape of the antennæ, the posterior margin of the pronotum, a spot on each lateral angle of the scutellum, the inner sides of the squamæ, the anterior and intermediate tibiæ in front, the posterior tibiæ at base above, a broad fascia on the basal abdominal segment and a narrow one on the following four segments white or yellow, these fasciæ all more or less broadly interrupted in the middle; the flagellum of the antennæ beneath, the anterior and intermediate tibiæ below, and the tarsi ferruginous; wings hyaline, nervures and tegulæ dark testaceous.

Var. with the anterior and intermediate femora more or less marked with yellow.

Hab. India (*Smith*); Dawnat Range, Tenasserim. ♂. *Length* 6·7; *exp.* 12–13 mm. ♀ unknown.

568. **Oxybelus nanus**, n. sp.

♂. Head, thorax, and abdomen closely and very finely punctured, the head and thorax having a granular appearance; clypeus anteriorly arched; medial carina on the scutellum and postscutellum indistinct; squamæ large, outwardly transparent; mucro small, much narrowed, the sides much curved over, nearly forming a tube, apex rounded; median segment beneath the mucro reticulate, the space enclosed by the inner carinæ small, shining at apex. Black; the clypeus and front with thick glistening silvery pile; a line on the pronotum, the tubercles, a spot at each lateral angle of the scutellum, the postscutellum, the squamæ inwardly, the anterior femora, the tibiæ and tarsi of all the legs, the intermediate and posterior femora beneath, a very large subtriangular spot on each side of the basal two abdominal segments, and narrow linear spots on each side of the two following segments yellow; antennæ fulvous; wings hyaline, nervures and tegulæ testaceous.

Hab. Rangoon, Burma. ♂. *Length* 4; *exp.* 7 mm. ♀ unknown. Type in coll. British Museum.

569. **Oxybelus ruficornis**, *Smith, Cat.* iv, p. 388, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 276.

♀. Head, thorax, and abdomen finely and closely punctured and pubescent; the scutellum with a medial carina continued over

the postscutellum between the scutellar lateral lamellæ, which are broad, and roundly curved on the outside, the inner sides emarginate, the apex acute; mucro narrow, not dilated at apex, and slightly but widely incised; the median segment beneath truncate, smooth and shining in the middle, the sides obliquely striate. Black; the base of the mandibles, the scape of the antennæ, a line on the pronotum, the tubercles, an ovate spot on each side of the scutellum, the scutellar lamellæ, the apex of the *mucro*, the apices of the femora, the tibiæ and tarsi, a large spot on each side of the basal abdominal segment, a line emarginate anteriorly on the margin of the 2nd, and a complete line on the margins of the 3rd and 4th segments, yellow; the antennæ, the coxæ and femora, and a stain on the intermediate and posterior tibiæ in front ferruginous; wings hyaline, nervures and tegulæ ferruginous.

Hab. India (*Smith*). ♀. *Length* 5·5; *exp.* 11 mm. ♂ unknown. Type in coll. British Museum.

570. **Oxybelus æstuosus**, n. sp.

♂. Head and thorax very closely and coarsely, abdomen much more finely punctured; clypeus very narrow, transverse; mesonotum, scutellum, and postscutellum with a medial longitudinal carina; the apex of the mesonotum, the scutellum, postscutellum, and inside of the mucro except at apex reticulate; median segment broad, the sides above obliquely and widely striate up to a lateral carina, below that nearly smooth, obscurely transversely striate; the enclosed triangular space at base below the mucro, and the apex of the median segment beyond smooth and shining; the squamæ rounded; the apex of the mucro deeply incised, its sides slightly recurved. Black; the scape of the antennæ, the posterior margin of the pronotum, the tubercles, squamæ, the anterior and intermediate femora beneath, the tibiæ and tarsi, the posterior tibiæ above and the tarsi, and elongate narrow subapical spots on each side of the basal four abdominal segments, yellow; the clypeus, front, and cheeks with a thin silvery pubescence; wings hyaline, nervures and tegulæ testaceous.

Hab. Tenasserim. ♂. *Length* 5·5; *exp.* 10 mm. ♀ unknown. Type in coll. British Museum.

*571. **Oxybelus insularis**, *Kohl, Termesz. Füzetek.* 1884, p. 109, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 276.

♀. "Black; mandibles yellow; a line on the pronotum, the tubercles, a spot on each side of the scutellum, the internal margin of the squamæ, and sublinear small spots on the 1–4 abdominal segments laterally, ivory-white. Anal segment black. Legs black, variegated with red and ivory-white. Wings subhyaline. Punctures somewhat sparse, denser on the abdomen than in *Oxybelus mandibularis*. Mesothorax shining, sparsely punctured. Mucro not dilated at apex and lightly emarginate."

Hab. "Ceylon. ♀. *Length* 5 mm."

*572. **Oxybelus flavipes**, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, pp. 276 & 277.

"Head closely punctured, the face, cheeks, and front densely covered with golden pubescence; the clypeus in the middle and trophi yellow; the tips of the mandibles black, piceous red before the black. Thorax punctured closely, covered with pale pubescence; a line on the collar, tubercles, tegulæ, the scutellum, except at the apex, clear stramineous-yellow; the lateral plates of the metanotum pale yellow. Pronotum rounded, the sides obliquely truncate; scutellum stoutly keeled down the centre; the central mucor [mucro?] longer than broad, very slightly and gradually dilated towards the apex, which is acutely and somewhat triangularly incised; the lateral plates are large, curved outwardly, and ending in a sharply triangular point; median segment with an oblique slope, finely shagreened; there is a short furrow below the central mucor [mucro?]; two keels run from the lateral plates, becoming united near the apex of the segment, and two other keels run from the sides; metapleuræ finely longitudinally shagreened. Abdomen shining, closely punctured, a yellow line on the sides of the segments; pygidial area densely covered with stiff depressed golden hairs. Wings clear hyaline, the recurrent nervure quite straight, not oblique, and received before the middle of the radial cellule. *Length* nearly 5 mm."

Hab. Barrackpore, Bengal. Type in coll. Rothney.

573. **Oxybelus fulvopilosus**, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, pp. 276 & 279, pl. x, fig. 23.

♀. Head, thorax, and abdomen minutely and closely punctured, the punctures on the head very dense and minute; clypeus broad, transverse, its anterior margin arched, not carinate; scutellum posteriorly with a prominent medial longitudinal carina continued over the postscutellum; squamæ punctured, acute at apex; mucro narrow, the sides recurved, the apex deeply incised; median segment beneath shining, with the usual four convergent carinæ, the space enclosed by the inner carinæ coarsely rugose at base, the apex with a deep shining fovea. Black; the clypeus, front and cheeks, and sides of the thorax with a thin silvery pubescence, and the vertex of the head and apical segment of the abdomen above with an obscure fulvous pubescence; the scape in front, the posterior margin of the pronotum, the tubercles, a spot on the lateral angles of the scutellum, the squamæ, the anterior and intermediate femora beneath, the posterior tibiæ above, and large oval spots on both sides of abdominal segments 1–5 above, yellow; the flagellum of the antennæ, the anterior and intermediate tibiæ and tarsi, and the posterior tarsi more or less fulvo-ferruginous; wings hyaline, nervures and tegulæ testaceous.

Hab. Barrackpore, Bengal. ♀. *Length* 7; *exp.* 13 mm. ♂ unknown. Type in coll. Rothney.

574. **Oxybelus canescens,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, pp. 276 & 278, pl. x, fig. 22.

♂. Head, thorax, and abdomen finely and closely but not densely punctured; clypeus with its anterior margin arched; scutellum and postscutellum with a medial longitudinal carina; squamæ small, rounded on the outside; mucro long, concave, the sides recurved, the apex deeply incised; median segment beneath shining, an inner and outer carina on each side all converging towards the apex of the segment; the triangular space enclosed by the inner carinæ and the space between the inner and outer carinæ with wide, not conspicuous oblique striæ; the apex of the enclosed triangular space very smooth and shining. Black; the clypeus, sides of the face, cheeks, and sides of the median segment with a thin silvery pubescence; the scape of the antennæ, the posterior margin of the pronotum, the tubercles, a large spot on each lateral angle of the scutellum, the postscutellum, squamæ, and apex of the mucro, the anterior and intermediate femora at apex, the tibiæ and tarsi, a large spot on each side of the basal abdominal segment, a more elongate subtriangular spot nearly meeting in the middle on each side of the 2nd segment, and narrow, anteriorly emarginate, transverse stripes on the 3rd and 4th segments above, ivory-white; the flagellum of the antennæ and a stain beneath on each intermediate and posterior tibia ferruginous; wings hyaline, nervures and tegulæ yellowish white.

Hab. Barrackpore, Bengal. ♀. *Length* 7; *exp.* 12 mm. ♂ unknown. Type in coll. Rothney.

*575. **Oxybelus lewisi,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 282.

"Black; densely covered with a short silvery pubescence; the punctuation close, moderately strong; the mandibles, tubercles, tegulæ in part, two elongate marks on the scutellum, metanotum, a line running from the scutellum and metanotum to the wings, a lateral mark on abdominal segments 1–5, and the knees, tibiæ, and tarsi, in front, yellow; wings clear hyaline, the nervures pale fulvous. Ocelli in a curve, the hinder separated by the length of the 3rd antennal joint; eyes rounded inwardly, converging beneath; the pubescence on the head in front long and dense; the punctuation finely rugose. Scutellum above flat, laterally obliquely margined; the apex of the metanotum rounded, without laminæ. Median segment above laterally obliquely, below transversely striolate, the striations wide apart and stout; shining, impunctate; metapleuræ finely rugose, obliquely striated; the spine at the base of the median segment stout, acute. Abdomen shining, aciculate, densely pilose; pygidial area acutely pointed, the pubescence fulvous, at the apex dense; the base of the petiole depressed, striolated. The recurrent nervure is received somewhere beyond the basal third of the radial cellule. *Length* 6 mm."

"*Hab.* Nugata, Ceylon."

Genus CRABRO.

Sphex, pt., *Linn. Faun. Suec.* p. 411 (1761).
Vespa, pt., *Linn. Faun. Suec.* p. 415 (1761).
Crabro, pt., *Fabr. Syst. Ent.* p. 373 (1775).
Rhopalum, pt., *Kirby, Steph. Syst. Cat.* p. 366 (1829).
Solenius, Blepharipus, Ceratocolus, Thyreopus, Crossocerus, Lindenius, Corynopus, Physoscelus, Dasyproctus, *Lepel. Ann. Soc. Ent. Fr.* iii (1834), pp. 712–804.
Entomognathus, Ectemnius, Brachymerus, Megapodium, *Dahlb. Hym. Eur.* i, pp. 295, 389, & 519 (1845).
Podagritus, *Spin. Gay, Chile,* vi, p. 353 (1851).

Type, *C. cribrarius*, Linn.

Range. Both hemispheres.

Fig. 89.—*Crabro auricomus*, ♀. $\frac{3}{2}$.

Head large, subrotund or subquadrate; mandibles simple or bidentate; clypeus transverse, nearly always pilose; front often excavate or furrowed; antennæ geniculate, inserted at the base of the clypeus; ocelli normal, generally placed in the centre of the vertex; thorax ovate, pronotum short transverse; scutellum prominent, lunulate; median segment very short, steeply sloped, sometimes truncate, always with a triangular or subcordate enclosed space at base; front wing with one radial and one cubital cell, radial cell slightly appendiculate, cubital cell receiving the one recurrent nervure towards the apex; legs short, stout, spinose, the tarsi longer than the tibiæ, the joints of the anterior tarsi in some species dilated in the male; abdomen pseudosessile, subpetiolate or petiolate; in some species the basal abdominal segment is closely applied to the median segment, almost truncate at base, in others it is subclavate, or again distinctly petiolate, nodose at the apex.

Very little is known of the habits of the Oriental forms of this genus. Some of the European species are known to make their burrows in bramble-sticks and decayed wood, and to store *Aphidæ* as food for their larvæ. In Burma I once noticed *C. opifex* carrying off *Aphidæ* from a rose-tree in my garden; but I could not trace her to her nest.

Key to the Species.

A. Abdomen petiolate.
- *a.* Petiole long, linear, nodose at apex.
  - *a'*. Enclosed space at base of median segment longitudinally striate; sides smooth; abdomen immaculate ...... *C. opifex*, p. 323.
  - *b'*. Enclosed space at base of median segment finely obliquely striate; sides coarsely striate; 2nd and 4th abdominal segments marked with greenish yellow .... *C. brookii*, p. 323.

c'. Enclosed space at base of median segment coarsely reticulate; 3rd, 4th, and 5th abdominal segments marked with bright yellow .... *C. buddha*, p. 323.
d'. Enclosed space at base of median segment coarsely obliquely striate; sides smooth; 2nd and 4th abdominal segments with oblique spots, 5th with a transverse band greenish yellow .... *C. orientalis*, p. 324.
e'. Enclosed space at base of median segment very smooth, polished, and shining; sides punctured; 1st, 2nd, 4th, 5th, and 6th abdominal segments marked with yellow .... *C. flavopictus*, p. 324.
b. Petiole short, sub-pyriform, gradually widened from base to apex.
a'. Basal joint of anterior tarsi twisted, dilated, and dentate at base .... *C. odontophorus*, p. 325.
b'. Basal joint of anterior tarsi normal, not twisted .... *C. ardens*, p. 325.

B. Abdomen non-petiolate.
a. Mesonotum longitudinally striate.
a'. Abdomen with the 2nd, 3rd, and 4th segments with lateral yellow spots: L. 10 mm......................... *C. sodalis*, p. 326.
b'. Abdomen, 1st segment with a yellow transverse band emitting a quadrate spot anteriorly; 2nd to 5th segments with transverse yellow fasciæ: L. 14 mm. .... *C. insignis*, p. 326.
c'. Abdomen, segments 1–4 with lateral yellow spots; 5th segment with a transverse yellow band: L. 7–8 mm. *C. spinifrons*, p. 327.
b. Mesonotum anteriorly transversely, posteriorly obliquely striate .... *C. auricomus*, p. 327.
c. Mesonotum punctured.
a'. Enclosed triangular space at base of median segment reticulate .... *C. quadriceps*, p. 327.
b'. Enclosed triangular space at base of median segment longitudinally striate.
a^2. Abdomen with the apical margins of segments 1–5 narrowly reddish, bases of segments 2–5 lined with silvery pile .... *C. argentatus*, p. 328.
b^2. Abdomen with lateral yellow spots on segments 1–5 .... *C. bellus*, p. 328.
c'. Enclosed triangular space at base of median segment obliquely striate.
a^2. Mesonotum densely and minutely punctured, opaque-looking ...... *C. palitans*, p. 329.
b^2. Mesonotum lightly punctured...... *C. fuscipennis*, p. 329.
d. Mesonotum with two short, medial, longitudinally-impressed lines anteriorly, and a deep round fovea on each side of them. *C. nanus*, p. 330.
e. Mesonotum smooth and shining, not punctured or striate .... *C. nitidus*, p. 330.

576. **Crabro opifex**, n. sp.

♀. Head, thorax, and abdomen opaque, with dense, extremely fine punctures, the posterior margin of the mesonotum, posterior margin of the scutellum, and the enclosed portion at the base of the median segment longitudinally striate, the apex of the petiole and extreme base of the 2nd segment of the abdomen polished and shining. Black, the clypeus and the cheeks behind the eyes with silvery pile, the sides and apex of the median segment with soft downy white pubescence; the scape of the antennæ in front, a broad line on the pronotum narrowly interrupted in the middle, the tubercles, two spots on the scutellum laterally, a line on the postscutellum, the anterior tibiæ, the apex of the intermediate tibiæ, and the posterior tibiæ above yellow; the tarsi fusco-ferruginous; wings hyaline and iridescent, nervures and tegulæ testaceous.

Hab. Tenasserim. ♀. *Length* 11; *exp.* 20 mm.

577. **Crabro brookii**, *Bingh. Jour. Linn. Soc.* 1896, p. 444.

♀. Head, thorax, and abdomen opaque, very finely and densely punctured; head large, square, a little broader than the thorax, with a medial longitudinally impressed line before and behind the anterior ocellus; the enclosed triangular space at the base of the median segment finely obliquely striate; on the posterior face of the median segment the striæ become coarser. Black, the clypeus and sides of the face with dense silvery pile; the scape of the antennæ, a line on the pronotum, the tubercles, a spot behind the tegula adjoining a lateral spot on the scutellum, the tibiæ and basal joint of the tarsi above, yellow; a lateral diagonal line at the base of the 3rd segment of the abdomen, with a lateral spot at the base of the 4th greenish yellow; the tarsi reddish; wings hyaline and iridescent, nervures and tegulæ testaceous.

Fig. 90. *Crabro brookii*, ♀. $\frac{3}{2}$.

Hab. Kumaun, and probably throughout Northern India. ♀. *Length* 12; *exp.* 20 mm.

578. **Crabro buddha.**

Rhopalum buddha, *Cam. Mem. Manch. L. Ph. Soc.* (4) ii, 1889, p. 18.
Crabro buddha, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 270.

♂. Head moderately finely, closely, and strongly punctured, pro- and mesonotum and scutellum with sparser and shallower punctures; abdomen dull and opaque, the basal half of the petiole and the extreme base of the 2nd segment polished shining; clypeus, the frontal hollow, and the cheeks densely pilose; pronotum notched in the middle; apex of the mesonotum, posterior margin of scutellum, anterior and posterior margins of post-scutellum, and the sutures between the pleuræ crenulate; median segment with the medial portion up to the apex enclosed by

curved prominent carinæ and coarsely reticulate, sides obliquely striate; abdomen with the apex of the petiole almost clavate, the base of the 2nd segment strongly constricted. Black, the pile on the face silvery; the mandibles except at apex, the scape of the antennæ, the posterior margin of the pronotum, the tubercles, a large spot at the lateral angles of the scutellum, with a small spot in front of it, an elongate spot on each side at base of the 3rd segment of the abdomen, a smaller one at base of 4th, and a minute speck at base of the 5th, bright yellow; the legs black variegated with yellow, the greater part of the femora, tibiæ, and tarsi being yellow; wings hyaline, nervures and tegulæ testaceous.

Hab. Tirhoot, Bengal; Bombay; Madras. ♂. *Length* 9; *exp.* 16 mm.

579. **Crabro orientalis,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 272.

♀. The clypeus, the frontal hollow, and the cheeks densely pilose, the pleuræ, the sides and apex of the median segment thinly pubescent, the head closely and finely punctured, the punctures less dense on the vertex; the clypeus raised and keeled in the middle; the ocelli in a wide triangle on the vertex; thorax not so closely punctured as the front, the apical margin of the mesonotum and of the scutellum, and the pleural furrow crenulate; median segment obliquely rugose-striate, bearing a Y-shaped furrow on its posterior face; abdomen dull opaque, obscurely pilose, the petiole swollen and clavate at apex, base of 2nd segment strongly constricted. Black, the pile on the head silvery, on the abdomen fuscous; the pubescence on the thorax longish and hoary white; the mandibles at base, the scape of the antennæ, the posterior margin of the pronotum, the tubercles, the scutellum transversely in the middle, a small spot on each side of the petiole at apex, and lateral oval spots on the 2nd, 4th, and 5th segments of the abdomen yellow; the spots on the 5th segment sometimes coalescent and forming a broad transverse yellow band above; legs, the femora at apex, the tibiæ and tarsi of all the legs yellow, stained here and there with ferruginous, sometimes the yellow of the legs is much overlaid with dark ferruginous; wings very light fusco-hyaline, nervures and tegulæ testaceous.

Var. With the yellow band on the scutellum reduced to a spot at each angle, the 3rd segment also with a lateral yellow spot.

♂ similar, but with the 5th abdominal segment smooth and polished and immaculate.

Hab. Kumaun; Barrackpore; Poona; Tenasserim. ♀ ♂. *Length* 8–11; *exp.* 14–18 mm. Type in coll. Rothney.

580. **Crabro flavopictus,** *Smith, Cat.* iv, p. 391, ♀; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 270.

♀. Head above closely and finely punctured, the region of the ocelli broad, flat, and with slight shallow hollows in front, beneath the hollows the front is vertical and is divided by a deep but narrow

furrow; clypeus and cheeks densely pilose; thorax smooth, with indistinct shallow fine punctures; median segment pubescent and punctured on the sides, the subcordate enclosed space at base very smooth, polished and shining, a central longitudinal furrow from base to the apex of the segment; abdomen smooth and shining. Black; the mandibles at base, the scape of the antennæ, the pronotum posteriorly, the tubercles, a small spot at the angles of the scutellum, a line on the postscutellum, the petiole of the abdomen, lateral spots on abdominal segments 2–4, the apex in the middle of the 5th, and the apical segment above, yellow; legs variegated with yellow; the petiole with fuscous stains; wings hyaline, nervures and tegulæ testaceous.

Hab. Northern India (*Smith*). ♀. *Length* 11; *exp.* 22 mm.

581. **Crabro odontophorus,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, pp. 270 & 271, pl. x, fig. 20 *a, b*.

♀. Head, thorax, and abdomen smooth and shining, the head and thorax with long sparse scattered pubescence; the clypeus, the front above the antennæ, and the cheeks densely pilose; clypeus subporrect, the apex broadly rounded and margined; front with a shallow vertical furrow, the space on each side slightly raised; median segment with a medial longitudinal furrow, the base and sides very finely rugose, the pleural furrows crenulate; abdomen, the basal segment formed into a petiole, slightly flattened at base, gradually increasing in width to the apex; base of 2nd segment scarcely constricted; legs stout, the basal joint of the anterior tarsi twisted, dilated at base, the expansion forming a blunt tooth; the intermediate and posterior femora greatly broadened, somewhat laminate. Black, the head and thorax with a chalybeous hue, the dense pile silvery, the pubescence hoary white; mandibles, outer sides (not front) of the scape of the antennæ, a broad posterior margin to the pronotum, the tubercles, a lateral subapical spot on the petiole of the abdomen, and large lateral spots at the base of the 3rd and 4th segments, yellow; the legs variegated with yellow; wings light fusco-hyaline, nervures and tegulæ testaceous brown.

Hab. Barrackpore, Bengal. ♀. *Length* 8; *exp.* 16 mm. Type in coll. Rothney.

582. **Crabro ardens,** *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, pp. 270 & 273, ♀ ♂.

♀. Head and thorax very finely and closely punctured, the clypeus, the space between the antennæ, and the cheeks densely pilose; clypeus slightly porrect, carinated down the middle; the front with a medial vertically impressed line from the anterior ocellus to between the antennæ; median segment with the basal area finely longitudinally striate, bounded by a curved furrow, the apex roundly truncate, bearing a medial broad furrow; abdomen smooth, obscurely pubescent, the pubescence soft, short,

and thin, only seen in certain lights. Black; the sides and apex of the clypeus obscurely, in the male yellow, in the female rufous; the posterior margin of the pronotum bright yellow; the dense pile on the clypeus and cheeks silvery; wings hyaline, nervures and tegulæ dark testaceous brown. Mr. Cameron gives the anterior legs as "brightly broad yellow beneath," but it is not so either in the type or in the only other specimen in Mr. Rothney's collection.

Hab. Barrackpore, Bengal; Bombay. ♀ ♂. *Length* 4½–5; *exp.* 9 mm.

583. **Crabro sodalis**, n. sp.

♀. Covered all over with a thin downy white pubescence; head, pronotum, scutellum, postscutellum, median segment, and abdomen smooth, polished and shining, mesonotum a little opaque and longitudinally striate; from the apex of the enclosed triangular space at the base of the median segment a vertical furrow, transversely striate inside, runs to the apex of the median segment. Black, the clypeus, face, and cheeks behind the eyes with dense silvery pile; the scape of the antennæ, a broad line on the pronotum slightly interrupted in the middle, the tubercles, a spot on the back of the tegulæ, two spots behind it on each side of the scutellum, a line on the postscutellum, the femora at apex, the tibiæ, and basal joint of the tarsi of all the legs above, and oval lateral spots on the 2nd, 3rd, and 4th segments of the abdomen, yellow; the posterior margins of all the segments narrowly testaceous; wings hyaline, nervures testaceous brown.

Hab. Tenasserim. ♀. *Length* 10; *exp.* 16 mm.

*584. **Crabro insignis**, *Smith, Cat.* iv, p. 422; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 270.

"♀. Black; head opaque, subquadrate, rather wider than the thorax; the stemmata in a curve placed forwards on the vertex; the clypeus covered with pale golden pubescence; antennæ and mandibles black. Thorax opaque, the collar grooved, with the anterior angles acute; the mesothorax longitudinally striated, with three abbreviated carinæ in front; the metathorax with a half-circular space at base enclosed by a sharp ridge, in the centre of which are two longitudinal carinæ; on each side it is striate, the sides coarsely rugose, behind transversely striate; the wings fusco-hyaline with a violet iridescence, nervures rufo-fuscous; anterior tibiæ ferruginous within; the posterior femora with a yellow stripe above, and the tibiæ with a stripe outside. Abdomen shining, the 1st segment with a yellow band in the middle, which emits a quadrate spot in front and has two deep notches behind; the 2–5 segments with a yellow fascia at their basal margins, which are narrowed in the middle; beneath the 2nd and 3rd segments have a yellow spot on each side.

"*Hab.* India (*Smith*). ♀. *Length* 14 mm."

585. Crabro spinifrons, n. sp.

♀ ♂. Head and abdomen smooth and shining; mesonotum and scutellum finely and the enclosed space at the base of the median segment coarsely longitudinally striate; the front above the antennæ deeply sulcate, with a pointed lamella projecting from the vertex over the sulcation. Black, a line on the pronotum, the tubercles, a spot on each side of the scutellum, a line on the post-scutellum, and lateral diagonally placed spots on segments 1-4 of the abdomen, with a transverse line at the base of the 5th segment, yellow; legs black, variegated with yellow; wings hyaline and iridescent, nervures and tegulæ dark testaceous.

Hab. Tenasserim. ♀ ♂. *Length* 7-8; *exp.* 11-13 mm.

586. Crabro auricomus, n. sp.

♀. Head very broad, quadrate, flat above, very finely punctured and densely pilose on the clypeus, the front, and behind the eyes; pronotum transverse, smooth and shining, with indications of a medial longitudinal groove; mesonotum anteriorly transversely, posteriorly obliquely striate, the striæ very fine and regular; scutellum and postscutellum smooth, slightly punctured; median segment pubescent at the sides and finely transversely striate, the enclosed space reticulate, with faintly marked short longitudinal carinæ; legs smooth, the tibiæ and tarsi with very few spines; abdomen smooth and shining. Black; the base of the mandibles, the flagellum of the antennæ, the scutellum, a line on the post-scutellum, the legs, and broad irregularly margined fasciæ across the middle of abdominal segments 1-5 above, yellow; beneath the 2nd, 3rd, and 4th segments are yellow, with subapical, lateral, lengthened black spots; wings hyaline, nervures and tegulæ testaceous yellow.

Hab. Assam. ♀. *Length* 14; *exp.* 24 mm.

587. Crabro quadriceps, n. sp. (Pl. II, fig. 7.)

♀. Head square above, the cheeks behind the eyes remarkably flattened; the clypeus pilose, its anterior margin with a remarkable double keel in the middle; the front, the sides of the head, vertex, and occiput closely and finely punctured; thorax more coarsely punctured, very sparsely on the scutellum, which is prominent, smooth, and shining; median segment short, with a very steep, almost vertical slope to the apex, slightly concave posteriorly and coarsely reticulate; legs short, stout, the tibiæ dilated, the posterior tibiæ with short stout spines on the outer side; abdomen smooth and shining, punctured, the punctures on the basal segment larger and coarser than on the following segments. Black; the clypeus and the inner orbits of the eyes with dense silvery pile; the scape and basal two joints of the flagellum of the antennæ, a large spot on each side on the pronotum, the tubercles, the apex of the femora, the tibiæ and basal joint of the tarsi of all the legs, and a lengthened lateral spot in the middle of segments 1-5 of the

abdomen bright chrome-yellow; the intermediate femora at base and the apical joints of the tarsi reddish brown; wings hyaline, with a brownish tint along the costal margins, nervures and tegulæ testaceous.

Hab. Kumaun, and probably throughout North-west India. ♀. *Length* 12; *exp.* 20 mm.

588. **Crabro argentatus.**

Lindenius argentatus, *Lepel. Ann. Soc. Ent. Fr.* iii (1834), p. 792; *id. Hym.* iii, p. 194; *Dahlb. Hym. Eur.* i, p. 300.

Crabro argentatus, *Smith, Cat.* iv, p. 423; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 270.

Oxybelus argenteolineatus, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, pp. 275 & 282.

♀. Head, thorax, and abdomen rather coarsely and closely punctured; clypeus narrow, transverse anteriorly, with a triple incision; a very short obscure furrow behind the anterior ocellus, and a shining fovea on each side of the posterior ocelli; the enclosed space at base of median segment coarsely longitudinally striate; apical margins of segments 1–5 of the abdomen narrowly smooth and shining, the bases of the 2nd to the 5th segment constricted and pubescent, the apical segment densely pubescent. Black; a line on the pronotum, the tubercles, the postscutellum, the coxæ beneath, the apex of the anterior femora, the tibiæ and tarsi, and the intermediate and posterior tibiæ and tarsi pale yellow, all the tibiæ with a black elongate spot beneath; the clypeus, sides of the face, cheeks, sides of the median segment, and base of abdominal segments 2–5 with dense short silvery pile; the apical margins of segments 1–5 narrowly obscure reddish; pygidium with dense reddish-brown pubescence; wings hyaline, the apex obscurely fuscescent.

Hab. India (*Lepeletier*); Barrackpore, Bengal. ♀. *Length* 6; *exp.* 12 mm.

This and two other species, *C. nitidus* and *C. bellus*, described by Mr. Cameron under the genus *Oxybelus* are undoubted *Crabro*, having no lateral squamæ or mucro, and a complete cubital and 2nd discoidal cells, separated by a well-marked nervure.

589. **Crabro bellus.**

Oxybelus bellus, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, pp. 276 & 280.

♂. Head, mesonotum, scutellum, median segment, and abdomen coarsely punctured and rugose, the pronotum, tubercles, and post-scutellum smooth, impunctate; clypeus slightly convex, transverse, arched anteriorly; frontal hollow deep, densely pubescent; mesonotum with a short central longitudinal carina anteriorly; median segment widely reticulate, the enclosed triangular space at base with a few coarse longitudinal striæ. Black; the clypeus, front to above the base of the antennæ, and cheeks with dense silvery pile; the posterior margin of the pronotum, the tubercles, a

large spot behind them on the mesopleuræ, a spot on the lateral angles of the scutellum, the postscutellum, and large oval subapical spots on each side of the basal five segments of the abdomen, yellow; legs yellow, the coxæ above, the bases of the anterior and intermediate femora in front above, and all but the apex of the posterior femora black; the base of the abdominal segments lined with silvery pile; wings hyaline, nervures testaceous; tegulæ yellow, with a spot of black in the middle.

Hab. Poona. ♂. *Length* 8; *exp.* 16 mm. ♀ unknown. Type in coll. Rothney.

Mr. Cameron in his description notes the markings and legs red, but that colour in the type specimen is without doubt due to potassium cyanide.

590. **Crabro palitans**, *Bingh. P. Z. S.* 1896, p. 446, pl. 15, fig. 6, ♀.

♀. Head and thorax very finely aciculate, dull and opaque; abdomen very finely and closely punctured, shining and polished; clypeus with an obscure vertical carina in the middle, the clypeus and the inner and outer orbits of the eyes, broadly interrupted at vertex, densely pilose; pronotum notched in the middle, mesonotum with a longitudinally impressed medial line anteriorly; median segment short, with a vertical slope to the apex, an enclosed triangular space at its base obliquely striate and medially longitudinally grooved; legs stout, the posterior tibiæ on the outside slightly spinose; abdomen about as long as the head and thorax, fusiform. Black; the clypeus and the orbits of the eyes with dense silvery pile; the scape of the antennæ, a broad line on the pronotum, a spot behind the tegulæ, the scutellum in the middle, a line on the postscutellum (wanting in some specimens), the apex of the femora, and a more or less lengthened spot on the outer side of all the tibiæ, and lengthened lateral spots at the bases of segments 2-5 of the abdomen, yellow; wings fuscous with a slight purple effulgence, nervures and tegulæ testaceous.

Hab. North-west India, Kumaun; Ceylon. Probably will be found throughout India. ♀. *Length* 11; *exp.* 20 mm.

*591. **Crabro fuscipennis**, *Lepel. Ann. Soc. Ent. Fr.* iii (1834), p. 710; *id. Hym.* iii, p. 113; *Smith, Cat.* iv, p. 422; *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, p. 270.

"Head black, mandibles black, with a spot of yellow on the middle. Antennæ black, the basal segment yellow, the apex black. Thorax black, lightly punctured, not shining. A yellow interrupted line on the pronotum. The tubercles yellow. Scutellum and postscutellum black. Metathorax striate, the striæ outwardly divergent. Abdomen black, shining, the 2nd, 3rd, and 4th segments with a line of yellow on each side at base, narrow and somewhat obliquely set, the 5th segment margined posteriorly with reddish yellow. Legs red, the anterior femora, the intermediate and posterior tibiæ, and the tarsi of all the legs blackish.

Wings hyaline at base, remainder fuscous; the nervures, stigma, and tegulæ black.

"*Hab.* India." No measurements are given. I have failed to identify this species.

592. **Crabro nanus**, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, pp. 270 & 274.

♀. Head and thorax minutely but sparsely punctured, shining; clypeus and the sinus of the eyes densely pilose; the front above the base of the antennæ enclosed by two lateral slightly divergent and one transverse furrow midway between the anterior ocellus and the base of the antennæ; a minute depression between the posterior ocelli; mesonotum anteriorly with two medial parallel, longitudinally impressed, short lines, and a deep circular small fovea on each side of them; median segment with a well-marked enclosed triangular space, the apex of the triangle reaching to the apex of the segment; the enclosure rugose, coarsely above and finely at the apex; abdomen smooth, shining, slightly pruinose. Black, the pile on the clypeus and face silvery; the scape of the antennæ in front, the posterior margin of the pronotum, the tubercles, and the apex of the femora, the tibiæ and tarsi of the legs bright yellow; wings hyaline, nervures testaceous.

Hab. Barrackpore, Bengal. ♀. *Length* $3\frac{1}{2}$; *exp.* about 6 mm. ♂ unknown. Type in coll. Rothney.

593. **Crabro nitidus.**

Oxybelus nitidus, *Cam. Mem. Manch. L. Ph. Soc.* (4) iii, 1890, pp. 276 & 281.

♀. Head, thorax, and abdomen smooth and shining; clypeus broadly convex; the front excavate, glabrous, a shallow depression from the posterior ocelli to the eyes on each side; eyes hairy; median segment with a few short stout longitudinal carinæ at base enclosed by two convergent carinæ, which are continued as a single carina to the apex of the segment; mesopleural furrow crenulate; metapleuræ excavate at base. Black, the clypeus and cheeks covered with dense silvery pile; the thorax and the pygidial area on the apical segment with a thin soft pale pubescence; the mandibles at base, clypeus, scape of the antennæ, a line on the pronotum, the tubercles, tegulæ, a spot at each lateral angle of the scutellum, a line on the postscutellum, and a lateral spot on the 1st, 2nd, 4th, and 5th abdominal segments yellow, the spots on the 2nd and 4th segments large; legs variegated with yellow; wings hyaline.

Hab. Barrackpore, Bengal. ♀. *Length* 7; *exp.* 12 mm. ♂ unknown. Type in coll. Rothney.

TRIBE *DIPLOPTERA.

Family EUMENIDÆ.

Tongue elongate, projecting beyond the mandibles or folded back against the sternum, the median part bifid at apex and with a lateral lamina surmounted by a corneous point at top of each of the divisions; head variable, wider or narrower than the thorax; antennæ geniculate or arched, stout or filiform, 12-jointed in the ♀, 13-jointed in the ♂; eyes reniform, the inner orbits having a sinus or emargination; thorax broad, more or less square in front, the posterior lateral angles of the pronotum reaching the base of the wings; legs generally slender and feebly armed, *the intermediate tibiæ with one spine at apex, the claws dentate.* Wings when at rest with a longitudinal fold; fore wing with one elongate radial cell, and, owing to the extension of the cubital nervure to the margin of the wing, four cubital cells, the 2nd cubital cell receiving both, or the 2nd and 3rd cells each receiving one, of the recurrent nervures, the 1st discoidal cell considerably longer than the 1st submedian cell. Abdomen very variable.

Key to the Genera.

A. First abdominal segment long and narrowed into a petiole.
- *a*. Petiole broad and flattened in the middle, narrow at base and apex; labial palpi 3-jointed, maxillary palpi 6-jointed .... ZETHUS, p. 332.
- *b*. Petiole not narrowed at apex; labial palpi 4-jointed, maxillary palpi 6-jointed.
  - *a'*. Mandibles long, pointed, without distinct teeth; antennæ inserted high up in the middle of the face .... EUMENES, p. 333.
  - *b'*. Mandibles short, truncate, dentate at apex; antennæ inserted very low down on the face .... LABUS, p. 348.
- *c*. Petiole gradually widening to apex; labial palpi 3-jointed, maxillary palpi 5-jointed, mandibles moderately long............ MONTEZUMIA, p. 349.

B. First abdominal segment not narrowed into a long petiole, either pseudosessile or only slightly narrowed.
- *a*. Second cubital cell not petiolate.
  - *a'*. Labial palpi 4-jointed, not plumed.
    - *a²*. Apical 3 joints of maxillary palpi very small; united, equal in length to the 3rd joint .... RHYNCHIUM, p. 351.

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* The 3rd and following abdominal segments in the *Diploptera* are strongly retractile and often withdrawn after death within the 2nd segment; therefore, to insure greater accuracy, all measurements of length are from the front of the head to the posterior margin of the 2nd abdominal segment.

b^2. Apical 3 joints of maxillary palpi very small; united, distinctly longer than the 3rd joint	ODYNERUS, p. 360.
b'. Labial palpi 3-jointed, plumed	PTEROCHILUS, p. 373.
b. Second cubital cell petiolate	ALASTOR, p. 374.

Genus ZETHUS.

Vespa, pt., *Fabr. Ent. Syst. Suppl.* p. 263 (1798).
Zethus, *Fabr. Syst. Piez.* p. 282 (1804).
Eumenes, pt. *Latr. Hist. Nat.* xiii, p. 344 (1805).
Epipona, pt., *Spin. Gay, Chile*, vi, p. 248 (1851).
Calligaster, *Sauss. Mon. Guêp. Sol.* p. 22 (1852).

Type, *Z. cœruleopennis*, Fabr.

Range. Neotropical and Oriental regions.

Head somewhat wider than the thorax, emarginate posteriorly; mandibles oblique at the apex, with large terminal teeth, short, scarcely forming a beak, the apices slightly crossing one over the other; antennæ inserted about the middle of the face, massive, the middle joints of the flagellum the thickest; clypeus broader than high; ocelli placed in a triangle somewhat anteriorly on the vertex. Thorax oval, pronotum anteriorly truncate; the median segment posteriorly steeply sloped; legs slight, short. Wings rather long and narrow; radial cell of fore wing short, not reaching beyond the apex of the 3rd cubital cell, shortly appendiculate; 1st cubital cell equal to the 2nd and 3rd united on the cubital nervure, 2nd cubital cell at top about one-fourth of its length measured on the cubital nervure, 3rd broader at top than it is on the cubital nervure. Abdomen: the 1st segment produced into a petiole, which is attenuate at base and apex, broad and vertically flattened in the middle; base of 2nd segment shortly petiolate; remaining segments forming with the 2nd a broad oval, rarely withdrawn inside it.

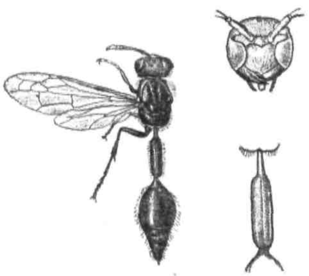

Fig. 91.—*Zethus dolosus*, ♀. $\frac{4}{3}$.

I have always found the species of this genus solitary, but have never come across the nest. Forbes ('A Naturalist's Wanderings in the Eastern Archipelago,' p. 72) states that the Javan species, *Z. cyanopterus*, makes a large communal nest like the social wasps.

Key to the Species.

a. Legs bright ferruginous	*Z. ceylonicus*, p. 333.
b. Legs black..................................	*Z. dolosus*, p. 333.

594. **Zethus ceylonicus**, *Sauss. Novara Reise, Hym.* p. 5.

♀. Head, thorax, and abdomen closely and somewhat coarsely punctured and pubescent, the pubescence short, not very dense, rather sparse and thin on the scape of the antennæ, the thorax, and legs; mesonotum with two longitudinal divergent grooves, anteriorly slightly widening and not quite reaching the margin; median segment almost vertically under the postscutellum, with a broad shallow median groove, having a narrow impressed line down the middle, and transversely striate; abdomen—the petiole long, grooved above, the rest of the segments subglobose. Black and shining, the pubescence fuscous, a narrow line on the posterior angles of the pronotum not continued to the front, a minute spot under it, the tegulæ and costal and medial nervure of the fore wing at base, and the trochanters, femora, tibiæ, and tarsi of all the legs bright ferruginous; wings fusco-hyaline with a purple effulgence.

Hab. Barrackpore, Bengal; Ceylon. ♀. *Length* 17; *exp.* 28 mm.

595. **Zethus dolosus**, n. sp.

Zethus cyanopterus, *Bingh.* (*nec Sauss.*) *Jour. Bomb. N. H. Soc.* v, p. 244, ♀.

♀. Head, thorax, and abdomen shining, punctured, thinly pubescent; clypeus broad, convex, arched anteriorly, the punctures fine and shallow; front and vertex more coarsely punctured; the tegulæ and sides of the median segment glabrous; mesonotum with two parallel impressed lines on the disc; scutellum medially longitudinally grooved; median segment with a medial broad sulcation, which within is finely reticulate and bears a longitudinal carina along the middle, the apex with two obtuse teeth; petiole densely punctured on the broadened portion and bearing an obscure medial longitudinal carina above; 2nd abdominal segment finely and sparsely punctured, 3rd broadly smooth and impunctate at base and narrowly along its apical margin, the middle finely and closely punctured; remaining segments with a few scattered punctures. Black; the pubescence fuscous; the flagellum of the antennæ dull opaque black: wings fusco-hyaline, darker along the costal margin of the fore wing.

Hab. Burma (Pegu Hills); Tenasserim. ♀. *Length* 15–16; *exp.* 28 mm. ♂ unknown.

Genus **EUMENES**.

Vespa, pt., *Linn. Faun. Suec.* p. 415 (1761).
Sphex, pt., *Christ, Naturg. Ins.* p. 315 (1791).
Eumenes, *Latr. Hist. Nat. Ins.* xiii, p. 344 (1805).

Type, *E. coarctata*, Linn.

Range. Both hemispheres.

Head flat; eyes large, prominent, the sinus in their inner orbits narrow; ocelli in a broad triangle on the vertex; antennæ of moderate length, the scape long, the flagellum incrassate in the female, the apex in the male hooked, curved or spirally rolled, inserted in

b^2. Apical 3 joints of maxillary palpi very small; united, distinctly longer than the 3rd joint	ODYNERUS, p. 360.
b'. Labial palpi 3-jointed, plumed	PTEROCHILUS, p. 373.
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Calligaster, *Sauss. Mon. Guêp. Sol.* p. 22 (1852).

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Fig. 91.—*Zethus dolosus*, ♀. $\frac{4}{3}$.

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Hab. Barrackpore, Bengal; Ceylon. ♀. *Length* 17; *exp.* 28 mm.

595. **Zethus dolosus**, n. sp.

Zethus cyanopterus, *Bingh.* (*nec Sauss.*) *Jour. Bomb. N. H. Soc.* v, p. 244, ♀.

♀. Head, thorax, and abdomen shining, punctured, thinly pubescent; clypeus broad, convex, arched anteriorly, the punctures fine and shallow; front and vertex more coarsely punctured; the tegulæ and sides of the median segment glabrous; mesonotum with two parallel impressed lines on the disc; scutellum medially longitudinally grooved; median segment with a medial broad sulcation, which within is finely reticulate and bears a longitudinal carina along the middle, the apex with two obtuse teeth; petiole densely punctured on the broadened portion and bearing an obscure medial longitudinal carina above; 2nd abdominal segment finely and sparsely punctured, 3rd broadly smooth and impunctate at base and narrowly along its apical margin, the middle finely and closely punctured; remaining segments with a few scattered punctures. Black; the pubescence fuscous; the flagellum of the antennæ dull opaque black: wings fusco-hyaline, darker along the costal margin of the fore wing.

Hab. Burma (Pegu Hills); Tenasserim. ♀. *Length* 15-16; *exp.* 28 mm. ♂ unknown.

Genus EUMENES.

Vespa, pt., *Linn. Faun. Suec.* p. 415 (1761).
Sphex, pt., *Christ, Naturg. Ins.* p. 315 (1791).
Eumenes, *Latr. Hist. Nat. Ins.* xiii, p. 344 (1805).

Type, *E. coarctata*, Linn.

Range. Both hemispheres.

Head flat; eyes large, prominent, the sinus in their inner orbits narrow; ocelli in a broad triangle on the vertex; antennæ of moderate length, the scape long, the flagellum incrassate in the female, the apex in the male hooked, curved or spirally rolled, inserted in

the middle of the face; clypeus of variable shape, generally pyriform or subpyriform and longer than broad; mandibles long, flat, pointed, forming by their junction a more or less acute beak, or crossing one over the other; maxillary palpi with six, labial

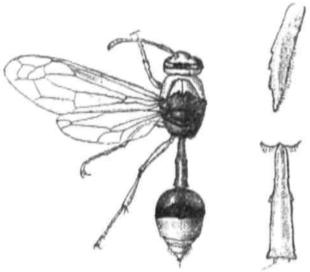

Fig. 92.—*Eumenes petiolata*, ♀. $\frac{5}{6}$.

Fig. 93.—*Eumenes petiolata*, ♂. Head and antenna.

palpi with four joints. Thorax a little longer than broad, subglobose; median segment short, nearly vertical, divided medially by a broad and at apex deep groove; legs slender, the apex of posterior pair not reaching the apex of the abdomen. Wings—the radial cell of the fore wing reaching well out towards the apex of the wing, the 1st cubital cell on the cubital nervure equal to or longer than the 2nd and 3rd united; the 2nd strongly narrowed towards the top; the 2nd transverse cubital nervure oblique, waved; the cubital nervure extended to the margin of the wing. Abdomen—the 1st segment extremely narrowed, forming a lengthened petiole; the 2nd sometimes narrowed at base; the 2nd and following segments united, pyriform.

Most if not all of the species of this genus make little rounded cells of clay for nests, provisioning these with caterpillars as food for their larvæ. *Eumenes conica*, *flavopicta*, and *arcuata* are very bold insects, coming into houses and constructing their nests on the walls, against the punkah, on the legs and bottom of chairs, tables, &c., and permitting close inspection of their nest-building operations without showing any alarm or irritation.

Key to the Species.

A. Median segment oblique, not vertical, grooved down the middle, the groove not broadened below.
  a. Apex of median segment quadridentate.
    a'. Petiole shorter or equal to the thorax and median segment united.
      a². Colours black and yellow, petiole of abdomen sometimes ferruginous .. *E. quadrispinosa*, [p. 336.
      b². Colours ferruginous red and yellow . *E. brevirostrata*, p. 337.
    b'. Petiole distinctly longer than thorax and median segment united .... *E. depressa*, p. 337.

b. Apex of median segment simple, not dentate . . . . *E. indiana*, p. 338.

B. Median segment convex, vertical, with a slight groove down the middle, groove not or scarcely broadened at apex.

a. Abdomen up to apex of 2nd segment punctured and granular in appearance.

a'. Second abdominal segment without a lateral yellow spot.

a^2. Legs black, variegated with yellow . *E. architectus*, p. 339.

b^2. Legs ferruginous . . . . *E. humbertiana*, p. 338.

b'. Second abdominal segment with a lateral yellow spot . . . . *E. punctata*, p. 339.

b. Abdomen smooth, slightly shining . . . . . . *E. affinissima*, p. 340.

C. Median segment convex, vertical, with a well-marked groove down the middle, widening at apex into a deep Λ-shaped hollow.

a. Petiole long, gradually widening to the apex, longer, never shorter than the thorax and median segment united, medially with well-developed prominent lateral tubercles

a'. Large, robust; length over 25 mm.

a^2. Second and following abdominal segments wholly black above; 2nd segment sometimes with a lateral red spot at base . . . . *E. circinalis*, p. 340.

b^2. Second abdominal segment wholly black, following segments red . . . . *E. xanthura*, p. 341.

c^2. Second abdominal segment red or blackish at base, apical half and following segments yellow. . . . . *E. petiolata*, p. 341.

d^2. Second abdominal segment red at base, apical half and following segments black . . . . *E. dimidiatipennis*, [p. 342.

b'. Smaller, more slender; length under 25 mm.

a^2. Second abdominal segment red at base, with a black transverse medial band, the apical third yellow.

a^3. Sides of the median segment posteriorly red; fore wing always with a subapical fuscous spot. . . . *E. esuriens*, p. 342.

b^3. Sides of the median segment yellow posteriorly; fore wing without a subapical fuscous spot . *E. gracilis*, p. 343.

b^2. Second abdominal segment red at base with a black transverse medial band, apical margin and following segments red . . . . *E. conica*, p. 343.

c^2. Second abdominal segment red at base with a medial black band, apical margin yellow, following segments red . . . . *E. elegans*, p. 344.

*d*². Second abdominal segment red at base, no black band, apical half yellow, following segments red.... *E. edwardsii*, p. 344.

b. Petiole very long, half as long again as the thorax and median segment united, narrow linear.

a'. Large, robust; length over 23 mm.

*a*². Colour black, with abundant yellow markings.

*a*³. Disc of mesonotum with two yellow hook-like marks back to back .... *E. flavopicta*, p. 345.

*b*³. Disc of mesonotum with two short lines and two transverse curved marks above them yellow ...... *E. arcuata*, p. 346.

*c*³. Disc of mesonotum entirely black. *E. blanchardi*, p. 347.

*b*². Colour entirely black; clypeus and space between antennæ in ♂ marked with yellow .... *E. curvata*, p. 347.

b'. Smaller and very slender, length 12 mm.; black with a few yellow markings .. *E. lenis*, p. 347.

D. Median segment comparatively longer, not vertical, depressed below the level of the postscutellum, and distinctly laterally compressed; of very small size, length 7-8 mm. .... *E. exigua*, p. 348.

596. **Eumenes quadrispinosa**, *Sauss. Mon. Guêp. Sol. Suppl.* p. 134, ♀ ♂, pl. vii, figs. 2, 2 *g*; *Smith, Cat.* v, p. 23.

♀. Head and thorax lightly and very sparsely punctured, the punctures on each side of the front somewhat closer, on the thorax very shallow and scattered; abdomen densely pruinose and opaque; clypeus broadly pyriform, convex, the apex sharply incised; median segment with a broad medial longitudinal furrow, with two sharp teeth on each side of it at apex; petiole stout, broad at apex, about as long as the remaining abdominal segments, the medial tubercles small but distinct and lateral. Black, the head yellow, the mandibles, a transverse line on the vertex, and the apical ten joints of the flagellum of the antennæ black, the last fulvo-ferruginous beneath: pronotum yellow, the posterior angles black; the tubercles, a spot at the base of the mesopleuræ, two parallel lines on the disc of the mesonotum, the tegulæ except a spot on the middle, the lateral angles of the scutellum, a line on the postscutellum, a spot above, and a large spot below on each side on the median segment, two contiguous spots on the apex of the petiole above, a band (emarginate anteriorly) on the posterior half of the 2nd abdominal segment, and the remaining segments yellow, the last black at base when exserted; legs black, variegated with yellow; the petiole of the abdomen ferruginous; wings deep flavo-hyaline,

Fig. 94.—*Eumenes quadrispinosa*, ♀. $\frac{5}{6}$.

with the extreme apex of the fore wings fuscous and the costal border darker in colour. The above is the description of the type specimen. The commoner variety has much less yellow on the head, and the broad band on the posterior half of the 2nd abdominal segment is reduced to an elongate oval spot on each side; the petiole also is black, not ferruginous.

♂ similar, slighter, the scape of the antennæ black with a streak of yellow anteriorly.

Hab. Mussooree, N.W. Himalayas; Sikhim; Calcutta; Central India; Madras; Burma; Tenasserim. ♀. *Length* 21–23; *exp.* 40–43 mm. ♂. *Length* 18–20; *exp.* 34–36 mm.

597. **Eumenes depressa**, *Sauss. Mon. Guêp. Sol. Suppl.* p. 135, ♀; *Smith, Cat.* v, p. 23.

♀ ♂. Vertex and front closely and finely punctured, thorax in front with a few scattered punctures; the postscutellum, median segment, and abdomen smooth and impunctate, the 2nd and following segments of the last densely pruinose; clypeus slightly convex, broadly subpyriform in the female, narrower in the male, deeply emarginate anteriorly; median segment posteriorly with a broad medial furrow and four blunt teeth at apex. Black; the clypeus, a vertical streak above it, the emargination of the eyes, a line on the inner orbits not reaching the vertex, the cheeks, a broad line on the pronotum, two hook-shaped marks back to back on the disc of the mesonotum, a spot on the mesopleuræ, the tegulæ, a square spot at each lateral angle of the scutellum, the sides posteriorly of the median segment, two elongate spots or streaks on the petiole above, two contiguous spots at its apex (these spots bent at right angles and continued along the sides at the apex of the petiole), a large oval spot on each side of the 2nd abdominal segment, and transverse anteriorly emarginate or festooned bands on the apical margins of segments 2–5, yellow; legs black variegated with yellow, a small round black spot on the yellow of the tegulæ, and a larger one on the yellow on each side of the median segment; wings fusco-hyaline with a fulvous tinge, slightly purplish along the costal margin of fore wing; the wings in the male paler than in the female.

Hab. India (*Saussure* and *Smith*); Tenasserim. ♀. *Length* 20; *exp.* 40 mm. ♂. *Length* 16; *exp.* 30 mm.

598. **Eumenes brevirostrata**, *Sauss. Mon. Guêp. Sol. Suppl.* p. 136, pl. vii, fig. 1, ♀ ♂; *Smith, Cat.* v, p. 23.

♀. Head, thorax, and abdomen nearly smooth, the few punctures on them widely scattered; clypeus oval, raised flat above the anterior margin, with two projecting teeth; front between the antennæ subtuberculate, with an elongate narrow depression above; median segment quadridentate at apex, medially furrowed; postscutellum subangular posteriorly; petiole not particularly long, broad at apex. Red; the clypeus, an irregular mark on the front,

extending to the sinus of the eyes and emitting a streak along the orbits towards the vertex, the cheeks and back of the head, the pronotum anteriorly, two parallel longitudinal lines on the disc of the mesonotum, a spot at the lateral angles of the scutellum, and the posterior half of the 2nd and following abdominal segments, yellow; legs variegated with yellow; wings flavo-hyaline, dull not iridescent.

♂ similar, smaller and slighter; the apex of the median segment sometimes yellow.

Hab. Sikhim; Calcutta; Madras. ♀. *Length* 18–20; *exp.* 42 mm. ♂. *Length* 17; *exp.* 40 mm.

599. **Eumenes indiana**, *Sauss. Mon. Guêp. Sol. Suppl.* p. 136, ♀, pl. vii, fig. 3; *Smith, Cat.* v, p. 23.

♀. Head, thorax, and abdomen sparsely punctured, shining; clypeus large, nearly hexagonal, slightly convex, its anterior margin incised; thorax depressed; median segment with a medial longitudinal furrow posteriorly, the sides obliquely truncate, smooth; petiole of abdomen with an obscure tubercle on each side of the middle underneath. Jet-black; a spot on the front, another above the base of the mandibles, the scape of the antennæ anteriorly, and transverse bands on the posterior margins of the basal two abdominal segments yellow, the band on the basal segment or petiole interrupted in the middle, that on the 2nd interrupted on each side above; apex of the mandibles, the tegulæ, and knees fulvous red; wings fusco-hyaline, suffused with violet.

♂ similar, smaller; the clypeus, a spot above it, a line in the emargination of the eyes, a line behind the eyes at top, the posterior margin of the pronotum, a spot on the tegulæ posteriorly, another on each lateral angle of the postscutellum, and a third on either side at the extreme apex of the median segment, yellow; the transverse bands on the posterior margins of the basal two segments complete; legs variegated with yellow.

Hab. India or Africa? (*Saussure*); Tenasserim. ♀. *Length* 14·5; *exp.* 28 mm. ♂. *Length* 12; *exp.* 24 mm.

600. **Eumenes humbertiana**, *Sauss. Novara-Reise, Hym.* p. 6, ♀ ♂.

♀. Vertex of the head, the thorax, petiole and 2nd segment of the abdomen somewhat strongly and closely punctured; the clypeus and the 3rd and following abdominal segments smooth, the clypeus broader below than at base and with its apex ending in two blunt teeth; the mandibles long and slender; the thorax globose, nearly as wide as long; the petiole of the abdomen long, slender at base, widened, with the sides nearly parallel from beyond the middle. Black; the extreme apex of the clypeus, the apical half of the mandibles, the tegulæ, and the femora, tibiæ, and tarsi of the legs ferruginous; the apex of the posterior tibiæ and the tarsi fuscous; a narrow twice-interrupted line on the margin of the pronotum, a spot under each wing, two contiguous spots on the postscutellum, a spot on each side of the median segment at base, sometimes another

on each side of the apex, and the margin of the petiole posteriorly yellow; wings dark fuscous with a purple effulgence.

♂ similar; the clypeus emarginate at apex, not bidentate.

Hab. Pundaloya (*Green*), Ceylon. ♀. *Length* 15; *exp.* 28 mm. ♂ slightly smaller.

601. **Eumenes architectus**, *Smith, Jour. Linn. Soc.* iii (1859), p. 20, ♀ ♂.

♀ ♂. Head, thorax, and abdomen finely and densely punctured, obscurely pubescent; clypeus convex, broader below than above, the apex deeply, the sides slightly emarginate; the median segment rounded posteriorly and bulging; petiole of abdomen long, subcylindrical, longer than the head and thorax united, the 2nd segment large and very broad. Black: clypeus in the male yellow, in the female black; a clavate spot between the antennæ, an obscure very short line behind the eyes at top, a narrow line on the pronotum, another, medially interrupted, on the postscutellum, a spot on each side behind the tegulæ, and a narrow line on the apical margins of the petiole and of the 2nd segment of the abdomen, yellow; legs black variegated with yellow; wings fusco-hyaline with a coppery effulgence.

Var. The yellow markings entirely wanting.

Hab. Tenasserim; Celebes. ♀ ♂. *Length* 11–12; *exp.* 23 mm.

The type from Celebes has more yellow about it, but many of the co-types from Celebes are like the Indian form described above.

602. **Eumenes punctata**, *Sauss. Mon. Guêp. Sol.* p. 37, ♀ ♂; *Smith, Cat.* v, p. 24.

♀. Head and thorax punctured, thinly pubescent, abdomen more densely punctured, granular; clypeus coffin-shaped, apex depressed and deeply incised; antennal carina short, clavate; median segment roundly truncate posteriorly, with a slight medial vertical sulcation. Black, the pubescence on the head and thorax short, soft, fuscous; two spots at the base of the clypeus, the antennal carina, the posterior margin of the pronotum broadly, the tegulæ, postscutellum, the apices of the femora, the tibiæ and tarsi, the posterior margins of the petiole and of succeeding four segments of the abdomen, and spot on each side of the 2nd segment, yellow; the yellow band on the petiole and on the 2nd segment deeply emarginate anteriorly; wings hyaline suffused with brown.

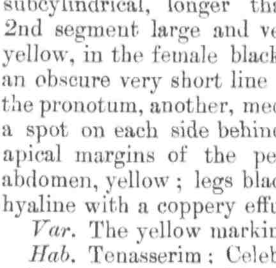

Fig. 95.
Eumenes punctata, ♀. 1/1.

♂ similar, only the petiole of the abdomen granular, 2nd and

succeeding segments punctured, shining; clypeus entirely yellow; the yellow band on the pronotum narrow.

Hab. Kumaun; Sikhim; Burma; Tenasserim. ♀. *Length* 13; *exp.* 26 mm. ♂. *Length* 11; *exp.* 20 mm.

603. **Eumenes affinissima,** *Sauss. Mon. Guêp. Sol.* p. 37, ♂; *Smith, Cat.* v, p. 21.

Eumenes mainpuriensis, *Smith, Trans. Zool. Soc.* vii, p. 189, ♂, pl. xx, figs. 3, 3 *a*.

♀ ♂. Head, thorax, and petiole of abdomen coarsely punctured, rugulose; clypeus coffin-shaped, the apex deeply incised, the antennal carina short; the front with an indistinct furrow below the anterior ocellus; median segment roundly truncate posteriorly, deeply furrowed down the middle. Black; the clypeus, the posterior margin of the pronotum, the tegulæ, the postscutellum, the apices of the femora, the tibiæ and tarsi of the legs, a transverse band on the posterior margins of abdominal segments 1–5 in female, 1–6 in male, and a spot on each side of the 2nd segment, yellow; wings hyaline, lightly fuscescent along the costal margin of the fore wing.

Var. A line on the cheeks behind the eyes at the top, two spots on each side of the median segment, and a spot on each side of the petiole in the middle yellow.

Hab. Mainpuri, N.W.P. (*Horne*); Tenasserim. ♀. *Length* 10–11; *exp.* 20–22 mm. ♂. *Length* 10; *exp.* 19 mm. I have followed Saussure in separating this species from the European *E. pomiformis*, but the two are very closely allied, if not identical.

604. **Eumenes circinalis,** *Fabr. Syst. Piez.* p. 286; *Sauss. Mon. Guêp. Sol.* p. 47, pl. x, fig. 7, ♀ ♂; *Smith, Cat.* v, p. 22.

♀. Head and thorax closely punctured, abdomen smooth, the petiole shining; clypeus long, pyriform, lightly emarginate at apex; antennal carina well-marked, branching into a narrow fork above the base of the antennæ; median segment furrowed down the middle, the furrow broad at apex; petiole not particularly long, the medial lateral tubercles well developed, almost spinose. Black; the clypeus, the inner orbits, the antennæ, the pronotum except its posterior angles, two oval spots on the mesonotum anteriorly, a spot on the mesopleuræ at base, the sides of the median segment, a **V**-shaped mark on the petiole, the sides of the petiole at apex, and the apical four ventral segments, red; legs red variegated with black; wings deep flavo- or fulvo-hyaline, darkening towards the base.

♂ similar, clypeus yellow.

Var. The petiole, except for a subapical band, and a spot on each side of the base of the 2nd segment red.

Hab. India (*Saussure* and *Smith*); Burma; Tenasserim. ♀. *Length* 25; *exp.* 50 mm. ♂. *Length* 23; *exp.* 45 mm.

605. **Eumenes xanthura**, *Sauss. Mon. Guêp. Sol.* p. 46, ♀; *Smith, Cat.* v, p. 21.

♀. Head and thorax pubescent, abdomen densely pruinose; the clypeus convex, subovate, the sides anteriorly roundly emarginate, the apex in the middle truncate; median segment with a medial vertically-impressed line ending in a deep triangular hollow; petiole of abdomen suddenly widened from the middle to the apex, the medial tubercles beneath large and well-developed. Black, the pubescence fuscous; two broad lines on the clypeus, an abbreviated line along the inner orbits below the emargination of the eyes, the scape, and basal three or four joints of the flagellum of the antennæ above, a spot between their bases, a line behind the eyes, a large patch on each side of the pronotum, the femora, tibiæ, and tarsi of the legs, the petiole of the abdomen, except a narrow subapical band above, and the apical four segments red; wings fulvous, hyaline.

♂ similar; the clypeus is shorter and narrower, the sides and apex as well being deeply emarginate; the clypeus is also wholly red, the line on the inner orbits yellow; the petiole of the abdomen is more shaded with black, and the basal three ventral segments have their apical margins narrowly red.

Hab. India (*Saussure* and *Smith*). ♀. *Length* 25–27; *exp.* 45 mm. ♂. *Length* 23; *exp.* 45 mm. I have seen no Indian specimen of this species; those in the British Museum are labelled "New Caledonia."

606. **Eumenes petiolata.**

Vespa petiolata, *Fabr. Sp. Ins.* i, p. 467; *Ent. Syst.* ii, p. 278.
Eumenes petiolata, *Fabr. Syst. Piez.* p. 284; *Sauss. Mon. Guêp. Sol.* p. 47, ♀ ♂; *Smith, Cat.* v, p. 26.

♀. Head and thorax with close shallow punctures, petiole smooth, the rest of the abdomen with the surface finely longitudinally aciculate; clypeus pyriform, its apex truncate; pronotum anteriorly transverse; median segment with a medial longitudinal furrow; petiole broadening towards the apex, slightly flattened. Head yellow, a broad black band between the eyes on the vertex; antennæ reddish brown; pronotum and mesonotum anteriorly yellow, the latter posteriorly black; scutellum and postscutellum reddish brown; sides of the thorax and legs black variegated with reddish brown; median segment reddish brown, with a narrow medial vertical black line; the sutures between the scutellum, postscutellum, and median segment black; petiole and basal third of the 2nd abdominal segment reddish brown, the former black at base and with a subapical black band, the middle of the latter black, its posterior third and the remaining abdominal segments yellow; wings deep flavo- or fusco-hyaline.

♂ similar, but slighter and generally darker; the 5th and 6th abdominal segments at base and the whole of the anal segment black.

A variety, which is most common, has the posterior portion of

the mesonotum and the flanks and legs reddish brown, with some black markings.

Hab. Throughout India, not ascending the hills above 2000 feet; Burma; Tenasserim; Ceylon; China; the Malayan subregion. ♀. *Length* 25–27; *exp.* 24–58 mm. ♂. *Length* 23–25; *exp.* 46–49 mm.

607. **Eumenes dimidiatipennis,** *Sauss. Mon. Guêp. Sol.* p. 51, ♀ ♂; *Smith, Cat.* v, p. 25.

♀. Head, thorax, and abdomen smooth and shining; clypeus oval, convex, anterior margin transverse; antennal carina large, very short, with a very short fork above the base of the antennæ; scutellum with a short medial longitudinal carina at base, and the median segment with a medial longitudinal furrow, indistinct at base, widening and deepening into a triangular hollow at apex. Obscure dull red, the vertex, the apex of the antennæ, a mark on each side, and another at the apex of the mesonotum, the base of the petiole, and the apical half of the 2nd and the whole of the following abdominal segments black; wings ferruginous, with nearly the apical half of the fore wing fuscous, having a purple effulgence.

Fig. 96.—*Eumenes dimidiatipennis*, ♀. ½.

♂ similar, but smaller and slighter; the head black, the orbits of the eyes red; mesonotum black, a black spot on the mesopleuræ.

Var. ♀. Entirely red, with no black markings.

Hab. Bombay; Malabar; Karáchi; Ahmadabad, Punjab; extending into Arabia and Africa. ♀. *Length* 24–27; *exp.* 52 mm. ♂. *Length* 22–25; *exp.* 46–50 mm.

608. **Eumenes esuriens.**

Vespa esuriens, *Fabr. Mant. Ins.* i, p. 293.

Eumenes esuriens, *Fabr. Syst. Piez.* p. 286; *Sauss. Mon. Guêp. Sol.* p. 56, ♀ ♂; *Smith, Cat.* v, p. 22.

♀. Clypeus and the cheeks behind the eyes smooth; front and vertex of the head and the thorax with close fine but shallow punctures; abdomen smooth, slightly shining; mandibles long, having a tooth at apex, and more or less toothed on the inner side; clypeus strongly convex, but flattened in the centre, its anterior margin transversely truncate at the apex, oblique at the sides, the front between the antennæ raised and prominent, with a broad short furrow at the base of the prominence; mesonotum anteriorly with a medial longitudinal fine carina, interrupted at the apex, but continued over the scutellum; median segment with a medial furrow broadening and deepening rapidly at apex; petiole as long as the head and thorax united, broadening at apex, beneath with two small tubercles in the middle and small depressions and

grooves at apex. Head yellow; a broad band between the tops of the eyes across the vertex black; antennæ light reddish; pronotum, pro- and mesopleuræ, and postscutellum yellow, mesonotum for the most part black; scutellum, median segment, and legs light reddish; the anterior tibiæ and tarsi yellow; petiole of abdomen and base of the 2nd abdominal segment light reddish, the petiole and 2nd segment with a subapical band black, followed by a band of yellow, the yellow on the latter occupying the apical half of the segment, remaining segments yellow, with their bases (when drawn out) black; wings flavo-hyaline, with their apical margins broadly light fuscous, and a narrow subapical spot on the fore wing dark fuscous, nervures and tegulæ yellow.

♂ similar, but more slender; anal segment, two spots on the 2nd ventral segment, and the posterior legs black.

Var. The head, except the black transverse band on the vertex, and the mesonotum light reddish.

Hab. Throughout India generally; Burma and Tenasserim. ♀. *Length* 18–20; *exp.* 34–37 mm. ♂. *Length* 16–18; *exp.* 28–32 mm.

609. **Eumenes gracilis**, *Sauss. Mon. Guêp. Sol.* p. 57, ♀ ♂.
Eumenes esuriens, *Smith* (*nec Fabr.*), *Cat.* v, p. 22, pt.

♀. Closely allied to and resembling *E. esuriens*, Fabr., but constantly more slightly built, with comparatively a broader clypeus, a longer petiole, and darker wings. In colour it differs considerably, and is very constant to type. I have seen no specimens that could be said to form links between the two species. Black; the clypeus and front up to the sinus of the eyes, a line on the cheeks, the pronotum, a large spot on the mesopleuræ, the postscutellum, the sides of the median segment posteriorly, a narrow subapical band on the petiole, and the posterior margins of the 2nd and following abdominal segments broadly yellow; the scutellum and the remaining parts of the petiole and 2nd segment red, the scutellum sometimes yellow; a band on the petiole and on the middle of the 2nd segment, with the bases of the remaining segments, black; antennæ and legs reddish, each of the former with a spot of black at its apex.

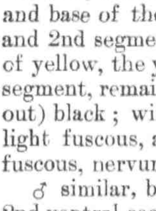

Fig. 97. *Eumenes gracilis*, ♀. 1/1.

♂ similar but slighter; anal segment black.

Hab. Egypt; Senegal (*Sauss.*); Sikhim; Burma; Tenasserim. ♀. *Length* 17–19; *exp.* 32–36 mm. ♂. *Length* 16–18; *exp.* 28–30 mm.

610. **Eumenes conica.** (Pl. II, fig. 9.)
Vespa conica, *Fabr. Mant. Ins.* i, p. 293; *Ent. Syst.* ii, p. 278.
Eumenes conica, *Fabr. Syst. Piez.* p. 285; *Sauss. Mon. Guêp. Sol.* p. 52, ♀ ♂; *Smith, Cat.* v, p. 22.

♀. Head, above the antennæ, and thorax closely and lightly

punctured; abdomen smooth and shining, with the surface minutely aciculate; clypeus pyriform, its apex truncate, the space between the antennæ raised and parting into two divergent carinæ towards the ocelli; pronotum transverse anteriorly; median segment with a medial vertically-impressed line, widening at the apex of the segment into a deep hollow; petiole subcylindrical, considerably thickened towards the apex; 2nd segment of the abdomen constricted at base, and having a wide, somewhat deep channel on its ventral side. Head yellow, the mandibles and antennæ reddish, a broad transverse band across the apex between the tops of the eyes black; thorax and abdomen dark red, the legs paler (sometimes yellowish); a medial longitudinal line on the mesonotum anteriorly, a transverse narrow line at its apex, the base of the 2nd abdominal segment, and a short transverse medially interrupted band on its middle above, black; wing dark flavo- or fusco-hyaline, with a slight purplish effulgence.

♂ similar, but smaller and slighter; the apex of the clypeus emarginate; the scape of the antennæ in front yellow; the cheeks black, with a narrow yellow line next the outer orbits, the base in the middle above of abdominal segments 3–5 and the anal segment black.

Hab. Throughout the plains of India, Burma, and Ceylon, extending to China and the Malayan region. ♀. *Length* 23–25; *exp.* 40–44 mm. ♂. *Length* 18–20; *exp.* 38–40 mm.

E. saundersii, Nietn., from the brief notice given of it in the Trans. Ent. Soc. 1834, pp. 60–62, I take to be the above species.

611. **Eumenes elegans**, *Sauss. Mon. Guêp. Sol.* p. 58, ♀; *Smith, Cat.* v, p. 25.

♀. Head and thorax thinly pubescent; clypeus shining, anteriorly emarginate. Ferruginous; a band between the eyes on the vertex, the mesonotum, the base of the petiole, and a broad band on the 2nd abdominal segment black; the posterior angles of the petiole and a band on the apical margin of the 2nd abbominal segment yellow; legs ferruginous; wings hyaline, ferruginous at their base, brownish fuscous with violet effulgence on their apical two-thirds.

Hab. Djidda, Arabia; India (*Saussure*). ♀. *Length* 20; *exp.* 38 mm. ♂ unknown.

I have not seen this species in any Indian collection, nor is it in either of the two collections I have examined from Aden.

612. **Eumenes edwardsii**, *Sauss. Mon. Guêp. Sol.* p. 60, ♀; *Smith, Cat.* v, p. 22.

♀. The vertex of the head and the mesonotum rather closely, pronotum, scutellum, and postscutellum more sparsely punctured;

median segment and abdomen smooth, the former slightly pubescent; clypeus convex, about twice as long as broad, anteriorly emarginate with a small tooth on each side; vertex of head and front rather flat; petiole of abdomen almost linear, without tubercles beneath. Ferruginous red; the clypeus, mandibles, and labrum, a short line on the middle of the pronotum, a streak on each side on the middle of the petiole, two subapical spots on the same above, and a broad band on the posterior margin of the 2nd abdominal segment yellow; the clypeus with silvery pile; the vertex of the head, the mesonotum, and the middle of the petiole above more or less black; legs with a yellow streak on the tibiæ; 3rd and following abdominal segments a brighter ferruginous red than the rest of the body; wings hyaline, lightly ferruginous along the costal margin of the fore wing and with a very faint fuscous spot in the radial cell of the same.

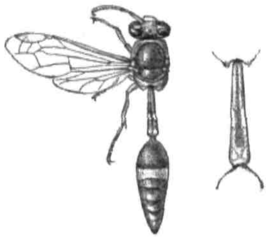

Fig. 98.
Eumenes edwardsii, ♀. $\frac{4}{3}$.

♂ similar, the sinus of the eyes yellow, the mesonotum entirely black.

Hab. Bombay; North-West Provinces; Burma; Tenasserim.
♀. *Length* 16; *exp.* 25 mm. ♂. *Length* 16; *exp.* 26 mm.

613. **Eumenes flavopicta**, *Blanch. Dict. Univ. Hist. Nat., Ins. Hym.* pl. ii, fig. 2; *Sauss. Mon. Guêp. Sol.* p. 65, ♀; *Smith, Cat.* v, p. 22.

♀. Head and thorax with large shallow, rather widely placed punctures, except on the disc of the mesonotum, where they are closer and deeper, with a tendency to run into longitudinal striæ; abdomen opaque, the surface finely aciculate; clypeus subpyriform, the apex widely truncate, raised at base and sides and then suddenly flattened and depressed; petiole of abdomen long, gently broadening towards the apex, slightly vertically compressed along its length. Black, shining; the head yellow with a black somewhat cowl-shaped mark on the vertex, or in a common form black with the clypeus, the front, the sinus of the eyes, and a line behind them yellow; thorax with the pronotum in front, the tegulæ (except a spot in the middle, sometimes absent), a small spot before and behind each of them, two scythe-shaped marks back to back on the mesonotum, a transverse rectangular mark on the scutellum, a curved line on the postscutellum, the median segment, and the flanks yellow, the last with a broad oblique line, and the median segment with a medial vertical line broadening above, black; legs yellow and black; abdomen with two spots at the base, two lateral in the middle, and a subapical band on the petiole,

a broad bar with irregular margins at base of 2nd segment, another broad subapical bar on its posterior margin, and broad transverse medially interrupted subapical bands on the remaining segments, yellow; beneath the abdomen is black, the 2nd ventral segment with a yellow spot on each side; wings dark flavo-hyaline, with a slightly fuscous tinge and purplish effulgence.

♂ similar, but slighter, with comparatively a longer petiole.

Hab. Sikhim; Bengal; Malabar; Mysore; Madras; Ceylon; Burma; and Tenasserim. ♀. *Length* 23–25; *exp.* 46–50 mm. ♂. *Length* 19–22; *exp.* 45–48 mm.

614. **Eumenes arcuata.**

Vespa arcuata, *Fabr. Syst. Ent.* p. 371; *id. Ent. Syst.* ii, p. 276.
Eumenes arcuata, *Fabr. Syst. Piez.* p. 287; *Sauss. Mon. Guêp. Sol.* p. 63, ♀; *Smith, Cat.* v, p. 29.

♀. Vertex of the head and the thorax with fine but shallow punctures; petiole and abdomen smooth, the surface finely aciculate; the clypeus pyriform, the apex sharply truncate; pronotum anteriorly transverse; the median segment with an impressed medial vertical line; the petiole long, narrow, only slightly broadening towards the apex; the base of the following abdominal segment constricted. Head and thorax black; the clypeus, the space between the antennæ, a line behind the eyes, the pronotum in front, two curved spots and two parallel longitudinal lines on the disc of the mesonotum, a broad outer border to the tegulæ, a spot on each side on the scutellum, a broad line on the posterior margin of the postscutellum, and a broad oblique line on the flanks under the base of each wing yellow; legs black, variegated with yellow; median segment yellow, with a broad medial mark, in the shape of a Maltese cross, black; abdomen black, two small lateral spots at the base of the petiole, and two about the middle, with a subapical band at the apex of the same above, two large pyriform spots near the base of the 2nd segment, and subapical bands on the posterior margins of the 2nd and following segments, yellow; these bands interrupted narrowly above and broadly below; the 2nd segment has also two minute lateral spots on the middle beneath; wings very light brownish or fusco-hyaline.

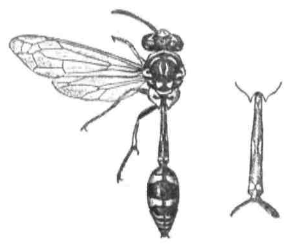

Fig. 99.
Eumenes arcuata, ♀. ⅟.

♂ similar, but smaller and slighter, with the anal segment entirely black. The depth of the yellow markings varies in different individuals.

Hab. Throughout India, Burma, and Ceylon, not extending up the Himalayas to any height, but spread generally through the

Indo-Malayan region as far as New Guinea. ♀. *Length* 24–26; *exp.* 49–52 mm. ♂. *Length* 19–21; *exp.* 36–38 mm.

615. **Eumenes blanchardi,** *Sauss. Mon. Guêp. Sol.* p. 66, ♀; *Smith, Cat.* v, p. 22.

♀ ♂. Closely allied to and resembling *E. arcuata*: differing chiefly in the head and thorax being totally devoid of the yellow markings present in that species; the clypeus is smaller, its apex angularly emarginate, not truncate, and the petiole more filiform.

Hab. India, Pondichery (*Saussure* and *Smith*). ♀. *Length* 23–26; *exp.* 41–44 mm. ♂. *Length* 20–21; *exp.* 36 mm.

616. **Eumenes curvata,** *Sauss. Mon. Guêp. Sol. Suppl.* p. 145, ♀; *Smith, Cat.* v. p. 25.

♀. Head and thorax with fine close but shallow punctures; abdomen entirely impunctate, smooth and shining; clypeus oval, strongly convex, widely but only slightly emarginate anteriorly; front between the antennæ subtuberculate, with an impressed medial line from the anterior ocellus to the apex of the convexity; median segment with a shallow impressed line from base leading to a deep triangular hollow at the apex; petiole long, filiform, with only an indication of the two tubercles in the middle below. Entirely of an intense black; wings dark fuscous, with a beautiful rich purple effulgence.

♂ similar, smaller and slighter, the wings somewhat lighter in colour; in some specimens a broad line down the middle of the clypeus and a triangular spot above it are yellow.

Hab. Burma; Tenasserim; the Philippines. ♀. *Length* 24–26; *exp.* 48–52 mm. ♂. *Length* 20–21; *exp.* 40–45 mm.

617. **Eumenes lenis,** n. sp.

♀. Head, thorax, and petiole of abdomen finely and somewhat closely punctured; 2nd and following segments of the abdomen smooth, highly polished, shining; clypeus scutiform, narrower above than below, the apex slightly emarginate, the sides oblique, the medial furrow on the slope of the median segment obscure, above distinct and widening into a triangular hollow at apex; petiole of abdomen very long, about twice the length of the head and thorax united, filiform; base of 2nd abdominal segment with a short petiole, the medial tubercles on the petiole beneath small, obscure; legs very slender. Black, the clypeus and apex of the median segment with a thin, short, hoary pubescence; the base of the clypeus, a spot above it between the bases of the antennæ, a transverse spot above that, a line on the pronotum, a spot in front of and two spots behind the tegulæ, a spot at the lateral angles of the postscutellum, an elongate spot on each side at the apex of the median segment, the anterior and intermediate tibiæ, and a narrow subapical line on the posterior margins of the petiole and 2nd segment of the abdomen, yellow;

tarsi rufo-fuscous; wings fusco-hyaline, darkest along the costal margin of the fore wing.

Hab. Rangoon, Burma. ♀. *Length* 12; *exp.* 19 mm. ♂ unknown.

618. **Eumenes exigua,** *Sauss. Mon. Guêp. Sol. Suppl.* p. 150, ♂; *Smith, Cat.* v, p. 22.

♀ ♂. Head, thorax, and the basal half of the petiole of the abdomen closely and finely punctured; rest of the abdomen smooth, impunctate, but not shining; head remarkably orbicular; clypeus nearly circular, slightly convex, its anterior margin not incised; antennæ inserted low down just above base of clypeus; pronotum transverse, slightly recurved along anterior margin and bearing a spine on the anterior lateral angles; median segment much depressed, with a medial deep longitudinal furrow from base to apex; petiole long, clavate, with a subapical constriction. Black: the front, the emargination of the eyes, the clypeus, the pleuræ, and sides and apex of the median segment with short silvery pubescence; the clypeus except a narrow margin anteriorly, a broad line on the pronotum, the margins of the tegulæ, two spots on the apex of the scutellum, the anterior and intermediate tibiæ and tarsi above, a spot at the base of each posterior tibia above, and narrow transverse bands on the margins of the petiole and of the 2nd abdominal segment, yellow; wings hyaline, shaded with fuscous.

Hab. India (*Saussure* and *Smith*); Burma; Tenasserim. ♀. *Length* 8; *exp.* 14 mm. ♂. *Length* 7; *exp.* 13 mm.

Genus LABUS.

Labus, *Sauss. Novara-Reise, Hym.* p. 3 (1867).

Type, *L. spiniger*, Sauss.

Range. The Oriental region.

"Mandibles short truncate, apex dentate but not along the inner margin, folded horizontally close to the clypeus, forming a very short beak. Maxillæ subelongate; palpi with 6 joints. Labium subelongate, palpi with 4 joints. Pronotum small, wide, anteriorly angular and toothed, posteriorly narrowed and arched. Legs slender, tarsi elongate, 1st joint of the tarsi longest. Wings normal. Second cubital cell not petiolate, but angular towards the radial cell, produced and truncate towards the base of the wing; receiving both recurrent nervures, the 1st recurrent nervure continuous with the lower margin of the cell.

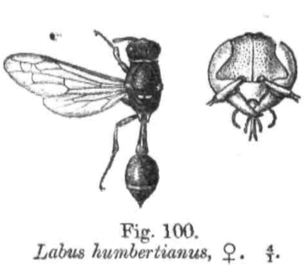

Fig. 100.
Labus humbertianus, ♀. $\frac{4}{1}$.

Radial cell wide, truncate or bluntly rounded at apex. Abdomen with a very long petiole, which is linear, only slightly dilated at the apex." (*Sauss.*)

619. **Labus humbertianus**, *Sauss. Novara-Reise, Hym.* p. 4, ♀ ♂, pl. i, fig. 2 (wing).

♀. Head, pro- and mesonotum, scutellum, and basal half of the petiole of the abdomen above coarsely and closely, median segment and 2nd abdominal segment very sparsely and finely punctured, the 3rd and following segments of the abdomen smooth; clypeus convex, bidentate anteriorly; median segment with a deep and broad sulcation, bidentate at apex. Black, with obscure silvery pile; the pronotum anteriorly, the lateral angles of the scutellum, and the apical margins of the petiole and of the 2nd abdominal segment, yellow; legs, the posterior tibiæ at base yellow; wings fusco-hyaline, tegulæ yellow, nervures black.

♂ similar; the scape of the antennæ in front and the middle of the clypeus yellow.

Var. ♀ resembling the ♂ in colouring, the tibiæ of all the legs above yellow.

Hab. Ceylon; Burma; Tenasserim. ♀ ♂. *Length* 8–9; *exp.* mm.

Genus MONTEZUMIA.

Eumenes, pt., *Fabr. Syst. Piez.* p. 288 (1804).
Odynerus, pt., *Spin. Ann. Soc. Ent. Fr.* x, p. 127 (1841).
Montezumia, *Sauss. Mon. Guêp. Sol.* p. 87, pl. v, fig. 3 (1852).

Type, *M. morosa*, Sauss., and *M. rufidentata*, Sauss.

Range. Neotropical and Oriental regions.

Head large, concave posteriorly; mandibles moderately long, narrow, the teeth on the inner margin rounded; antennæ inserted about the middle of the face; clypeus broadly pyriform. Thorax not narrowed anteriorly, truncate, with the head closely approximate, oval posteriorly, with a rounded steep slope; legs stout, of moderate length. Wings long and broad; radial cell in fore wing deep, the apex acute and on a level with the apex of the 3rd cubital cell; 1st cubital cell one-fourth as long again, measured on the cubital nervure, as the 2nd and 3rd united; 2nd strongly constricted at top, 3rd wider above than on the cubital nervure. Abdomen (in the Oriental species) petiolate, the petiole much broadened at the apex; 2nd segment very large; remaining segments much smaller, often withdrawn telescopically inside the 2nd.

Fig. 101.—*Montezumia burmanica*, ♀. $\frac{3}{1}$.

Key to the Species.

a. Head, thorax, and abdomen black, immaculate	*M. indica*, p. 350.
b. Head, thorax, and abdomen black with yellow markings.	
a'. Markings few and slight; wings dark...	*M. burmanica*, p. 350.
b'. Markings numerous and moderately broad; wings light brownish hyaline.	*M. impavida*, p. 351.

620. **Montezumia indica.** (Pl. II, fig. 10.)

Sauss. Mon. Guêp. Sol. Suppl. p. 167, ♀, pl. ix, fig. 4; *Smith, Cat.* v, p. 41.

♀. Head, thorax, and abdomen finely punctured; the vertex and front with rather a coarse granular appearance, the thorax and abdomen more sparsely punctured than the head; clypeus flat, anteriorly truncate, the margin transverse; median segment rounded posteriorly, with a medial deep longitudinal groove, the apex emarginate on each side; petiole of abdomen flat in the middle, coarsely longitudinally striate. Jet-black and shining; the clypeus in the middle, a line on the scape of the antennæ in front, the apex of the median segment on each side, and a spot on the apical joint of all the tarsi, orange; wings deep fuscous brown, with a coppery and purple effulgence.

Hab. Sikhim (rare); Java. ♀. *Length* 23–25; *exp.* 50–54 mm.

621. **Montezumia burmanica,** n. sp.

♀. Closely allied to and resembling *M. indica*, Saussure, but smaller, different in sculpture, and with a few slight yellow markings. Head, thorax, and abdomen punctured, the punctures on the head finer and closer than on the thorax, those on the abdomen widely spaced and confined to the basal two segments and apical margins of the 3rd and 4th, the bases of these two segments and the 5th and 6th smooth; clypeus large, convex, the apex depressed and emarginate; the front between the antennæ subtuberculate; scutellum large, with a broad, smooth, shining, medial longitudinal carina; median segment finely rugose, the sides obliquely truncate, smooth, with a few indistinct oblique striæ, a wide deep, medial longitudinal furrow runs from base to apex of the segment; petiole with an obtuse tubercle on each side beneath close to the middle, and a medial longitudinal furrow on the apical half above. Jet-black; a minute spot between the bases of the antennæ, another behind the eyes, an abbreviated narrow line on the posterior margin of the pronotum in the middle, and a transverse narrow line on the posterior margin of the basal two abdominal segments, yellow; the line on the basal segment interrupted in the middle, that on the 2nd segment interrupted broadly on each side; legs black, a yellow line on the anterior tibia above, and the knees and apical joint of the tarsus obscurely fulvous red; wings fuscous with a purple effulgence, the posterior wing hyaline at base.

♂ similar, but smaller; a triangular spot at the base of the clypeus, another above it, and a minute spot in the emargination of the eyes yellow; the yellow markings on the anterior tibiæ and on the abdomen absent.

Hab. Tenasserim. ♀ *Length* 16; *exp.* 30 mm. ♂ *Length* 12; *exp.* 24 mm.

622. **Montezumia impavida**, n. sp.

♀. Head, thorax, and abdomen punctured, the punctures fine, sparse and shallow on the head and thorax, somewhat denser and deeper on the abdomen; clypeus broadly pyriform, convex, flat in the middle, the apex lightly emarginate; mesonotum with a longitudinally-impressed line on the disc; median segment divided down the middle by a broad furrow; petiole of abdomen with a medial shallow furrow on its apical half. Black, shining; a spot at the base of the mandibles, the clypeus, a wedge-shaped spot above it, the scape of the antennæ in front, a line on the inner orbits entering the emargination of the eyes and running to the vertex, a broad line behind the eyes not reaching the vertex, the sides of the pronotum broadly but not reaching the posterior angles, a spot at the base of the mesopleuræ, the tegulæ, a spot in front and another behind them, two parallel longitudinal lines on the mesonotum, the lateral angles of the scutellum, a line on the postscutellum, the apical half of the median segment, a transverse band on the apical margin of the petiole, a much broader band, deeply emarginate in the middle anteriorly, on the 2nd addominal segment, a narrow band on the apical margin of the 3rd segment, this band with a small incision anteriorly on each side, and a square mark in the middle of the apical margins of the 4th and 5th segments, yellow; legs black, variegated with reddish yellow: wings brownish hyaline, darker along the costal margin; nervures dark brown, tegulæ with a spot of black in the middle.

Hab. Burma (Pegu Hills); Tenasserim. ♀. *Length* 14; *exp.* 27 mm.

Genus **RHYNCHIUM**.

Vespa, pt., *Fabr. Ent. Syst.* ii, p. 265 (1793).
Polistes, pt., *Fabr. Syst. Piez.* p. 273 (1804).
Rygchium, *Spinola, Ins. Lig.* i, p. 84 (1806).
Odynerus, pt., *Guér. Voy. Bélanger, Zool.* p. 503 (1834).
Rhynchium, *Sauss. Mon. Guép. Sol. Suppl.* p. 170 (1854).

Type, *R. oculatum*, Fabr.

Range. Both hemispheres.

Head variable, generally as broad as the thorax; eyes reniform, the inner orbits being deeply emarginate; clypeus pyriform, longer than broad: mandibles long, somewhat narrow, inner margin oblique, with blunt teeth; labial palpi thick, of four joints, the apical joint very small; maxillary palpi of six joints, basal joint somewhat thick, the rest slender, basal three subequal, apical three

united about equal in length to the third joint; antennæ filiform; ocelli three, complete, round, placed in a broad triangle on the vertex. Thorax ovate; pronotum short in front, the lateral angles carried posteriorly to the base of the wings; mesonotum large, generally broadly egg-shaped, posteriorly broader than in front; postscutellum prominent as a rule; median segment vertical, depressed beneath the postscutellum, the sides bulging, often produced posteriorly and dentate, the apex of the segment generally concavo-truncate; legs slender, short, the intermediate tibiæ with one apical spine, the claws unidentate beneath. Wings long, broad, and ample; fore wing with the radial cell moderately large, slightly appendiculate; three cubital cells, the 1st, measured on the cubital nervure, as long as or longer than the 2nd and 3rd united, the 2nd irregularly triangular, with the apex of the triangle truncate, receiving the 1st recurrent nervure before and the 2nd recurrent nervure after the middle; 3rd cubital cell quadrate. Abdomen pseudosessile, never petiolate; basal segment cup-shaped, or only slightly constricted and narrowed.

Fig. 102.
Rhynchium flavolineatum, ♀. $\frac{1}{1}$.
1, mandible; 2, maxilla; 3, claw.

The species of this genus are solitary or in pairs, never in social communities. The Indian species come freely into houses, building little round shells of clay for nests, and provisioning these with caterpillars. Occasionally an already existing cavity is made use of, and the aperture closed with a clay lid.

Key to the Species.

A. Basal segment of abdomen slightly constricted, the apex distinctly narrower than the base of the 2nd segment.
  a. Clypeus nearly as broad at apex as at base, not marked with yellow.
    a′. Legs black, intermediate and posterior femora blood-red; wings hyaline at base. *R. erythropus*, p. 353.
    b′. Legs orange-brown, femora concolorous; wings not hyaline at base .... *R. mölleri*, p. 354.
  b. Clypeus much narrower at apex than at base, marked with yellow (♀) .... *R. cupreipenne*, [p. 354.
B. Basal segment of abdomen cup-shaped, not constricted nor distinctly narrower than the base of the 2nd segment.
  a. Wings deep ferruginous yellow.
    a′. Wings fuscous brown for one-third or more of their length from base; basal segment of abdomen entirely black.

a^2. Second and following segments of abdomen broadly bordered posteriorly with reddish brown .... *R. hæmorrhoidale*, [p. 354.

b^2. Second and following segments of abdomen entirely black .... *R. atrum*, p. 355.

b'. Wings only slightly fuscous at base; basal segment of abdomen entirely reddish brown or black at base, broadly bordered with reddish brown .... *R. brunneum*, p. 355.

b. Wings fuscous or fusco-hyaline.

a'. Wings entirely deep fuscous brown with a purple effulgence; abdomen without yellow transverse bands.

a^2. Abdomen dull orange-brown.

a^3. Basal abdominal segment black .... *R. mellyi*, p. 356.

b^3. Basal abdominal segment orange-brown, with a transverse black marginal band .... *R. abdominale*, p. 357.

b^2. Abdomen entirely black .... *R. argentatum*, [p. 358.

c^2. Abdomen black, sides of segments 3–5 marked with orange-red .. .. *R. bengalense*, p. 359.

b'. Wings fuscous along the costal margin of fore wing, hyaline or fusco-hyaline posteriorly; abdomen black.

a^2. Median segment with the sides produced posteriorly, angular and dentate ...... *R. nitidulum*, p. 357.

b^2. Median segment with the sides rounded posteriorly, not angular .... *R. metallicum*, p. 358.

c'. Wings fusco-hyaline; abdomen black with transverse yellow bands: ♀ only known.

a^2. Clypeus black; basal two abdominal segments with narrow yellow medially interrupted bands .... *R. flavomarginatum*, [p. 359.

b^2. Clypeus yellow; abdominal segments 1–5 with broader yellow bands not medially interrupted .... *R. flavolineatum*, [p. 360.

623. **Rhynchium erythropus**, n. sp.

♀. Head, thorax, and abdomen shining, very closely, evenly, and somewhat coarsely punctured, the bases (ordinarily not seen) of the 2nd and following segments of the abdomen broadly smooth; clypeus shield-shaped, raised, broadly flat down the middle, broadly truncate and slightly emarginate anteriorly; a very short trident-shaped carina between the antennæ; abdomen with the basal segment distinctly narrower than the 2nd. Intense black, two small spots immediately above the base of the antennæ, a line on the outer side of the scape of the latter, and the apical joint of the fore tarsi above, yellow; the intermediate and posterior femora blood-red; the sides and the truncated apex of the median segment with a little thin short hoary pubescence; wings fusco-hyaline with a rich purple effulgence, the base clear hyaline.

Hab. Tenasserim. ♀. *Length* 14; *exp.* 34 mm. Type in the British Museum.

624. **Rhynchium mölleri**, n. sp. (Pl. II, fig. 11.)

♀. Head, thorax, and abdomen densely punctured, the punctures shallow and not so well marked at the bases of the abdominal segments, which when drawn out have the extreme base smooth; clypeus slightly raised, broad, wedge-shaped, the apex transverse, slightly and widely emarginate; antennal carina short, very fine and narrow; postscutellum not very prominent; median segment depressed beneath it, vertical, concavo-truncate posteriorly, with a medial vertical carina and faint oblique striæ on the face of the truncation, the sides not angularly produced back; abdomen with the basal segment distinctly narrower than the 2nd, its apical margin slightly constricted. Head black, the clypeus fulvous red, two spots between the antennæ yellow, the antennæ and the greater part of the thorax and median segment brownish red; the mesonotum anteriorly, a broad irregular U-shaped mark on its disc, the sutures between the scutellum, the postscutellum, and median segment, with the sides of the thorax, except the tubercles, black; legs red; wings light cupreous brown and iridescent.

Hab. Sikhim. ♀. *Length* 14–16; *exp.* 30–33 mm. ♂ unknown. Type in coll. British Museum.

625. **Rhynchium cupreipenne**, *Bingh. Jour. Bomb. N. H. Soc.* viii, p. 387, ♀, pl. i, fig. 3.

♀. Head, thorax, and abdomen coarsely and very closely punctured, the punctures with a tendency to run into striæ on the thorax; clypeus pyriform, truncate anteriorly, with two minute teeth; postscutellum prominent; median segment depressed vertically under the postscutellum, concavo-truncate, the sides produced and sharply angular, the truncation with a medial vertical carina and fine oblique striæ; abdomen with the basal segment narrower than the 2nd, the latter both long and broad, the posterior margins of all the segments narrowly smooth. Black; the clypeus, except a black mark in the middle, a large round spot above it on the front, the antennæ, a broad stripe behind the eyes, the apex of the anterior femora, the tibiæ and tarsi, the inner side of the intermediate and posterior femora, and the last joints of the tarsi orange-yellow; the inside of the tibiæ and tarsi of the posterior legs clothed with rich golden pubescence; wings cupreous brown with bright iridescent tints in certain lights, nervures and tegulæ black.

Hab. Tavoy, South Tenasserim. ♀. *Length* 14; *exp.* 34 mm. ♂ unknown. Type in coll. British Museum.

626. **Rhynchium hæmorrhoidale.**

Vespa hæmorrhoidalis, *Fabr. Syst. Ent.* p. 366.
Odynerus dimidiatus, *Guér. Voy. Bélanger, Zool.* p. 503, *Atlas, Ins.* pl. iv, fig. 4.
Rygchium hæmorrhoidale, *Sauss. Mon. Guêp. Sol.* p. 109.
Rygchium parentissimum, *Sauss. Mon. Guêp. Sol.* p. 111.
Rhynchium hæmorrhoidale, *Sauss. Mon. Guêp. Sol. Suppl.* p. 172; *Smith, Cat.* v, p. 44.

♀. Head and thorax very finely and closely punctured, abdomen more coarsely punctured, especially along the posterior portions of the segments; clypeus raised, somewhat flat above, pyriform, ending anteriorly in a narrow point, which is lightly emarginate: postscutellum prominent, projecting posteriorly; median segment depressed vertically beneath the postscutellum, concavo-truncate posteriorly, the sides bulging and angularly produced, the punctures on them running into transverse striæ, the truncation finely, transversely striate; abdomen with the basal segment not narrowed. Black; the clypeus, the front except a black triangular mark, the prothorax, the tegulæ, and the posterior margins narrowly of the 1st and more broadly of the 2nd and following abdominal segment deep brownish red; antennæ and legs black, sometimes more or less brownish red; wings deep yellow, brownish fuscous for nearly half their length from base.

♂ similar, but the clypeus and a transverse spot above it yellow, the antennæ and anterior tibiæ and tarsi fulvous or orange-red.

The above are the common forms, but the amount of red and black varies greatly in specimens from different localities.

Hab. Barrackpore, Bengal; Madras; Bangalore; Ceylon; Burma; Tenasserim; Java; Cape of Good Hope (*Smith*). ♀. *Length* 16–18; *exp.* 40–44 mm. ♂. *Length* 12–14; *exp.* 28–31 mm.

627. Rhynchium atrum.

Rygchium atrum, *Sauss. Mon. Guêp. Sol.* p. 109, ♀ ♂.
Rhynchium atrum, *Smith, Cat.* v, p. 44.

♀. Closely resembles some varieties of *R. hæmorrhoidale*, but is always darker, and the posterior margin of the mesonotum and the scutellum are always impunctate and highly polished; the clypeus is grooved longitudinally near the apex, and the wings are sometimes slightly infuscated at apex and not at all at base. Some varieties have the clypeus, a spot between the antennæ, and the occiput and cheeks brownish red, others are entirely black.

♂ has the clypeus yellow.

Hab. India (*Saussure* and *Smith*); South Tenasserim, extending into the Malayan region as far south as New Guinea. ♀. *Length* 18–20; *exp.* 36–42 mm. ♂. *Length* 17; *exp.* 30 mm.

628. Rhynchium brunneum.

? Vespa quinquecincta, *Fabr. Ent. Syst.* ii, p. 261.
Vespa brunnea, *Fabr. Ent. Syst.* ii, p. 264.
Vespa carnatica, *Fabr. Ent. Syst. Suppl.* p. 261.
Rygchium brunneum et carnaticum, *Sauss. Mon. Guêp. Sol.* p. 112, ♀ ♂.
Rhynchium brunneum et carnaticum, *Smith, Cat.* v, p. 44.

♀. Head, thorax, and abdomen rather finely and sparsely punctured, the punctures shallow on the bases of the abdominal

segments, coarse and somewhat more dense on the apical margins of segments 2–5 above; clypeus strongly convex, pyriform, the apical third with a broad medial vertical groove, the extreme apex truncate or lightly incised; the scutellum and postscutellum smooth and shining, the latter gibbous, oblique and narrow; the median segment very short, depressed below the postscutellum, concavo-truncate posteriorly, the sides rounded, not angularly produced back, face of the truncation lightly transversely striate. Brownish red; a spot between the antennæ, a vertical line on the front, a large triangular spot on the mesonotum in front, a line along its apex, the median segment in the middle posteriorly, the basal half of the legs, the basal two-thirds of the 1st, and the basal half of the 2nd abdominal segment black; wings ferrugineo-hyaline, deeper and darker towards the base.

Fig. 103.—*Rhynchium brunneum*, ♀. ½.

♂ similar, the median segment more deeply concavo-truncate, the sides produced posteriorly and armed with two stout spines, the apical margins of abdominal segments 2–5 much more coarsely punctured, the clypeus and scape in front from a light fulvous red to a bright yellow.

Varieties have the black markings more or less developed, or even altogether wanting (var. *carnaticum*).

Hab. Throughout India, Burma, Tenasserim, and Ceylon, extending to Malacca, Sumatra, and Borneo to the South-east, and to Afghanistan and Persia to the North-west. ♀. *Length* 17–20; *exp.* 37–41 mm. ♂. *Length* 12–15; *exp.* 26–28 mm.

629. **Rhynchium mellyi.**

Rygchium mellyi, *Sauss. Mon. Guêp. Sol.* p. 116, ♀.
Rhynchium mellyi, *Sauss. Mon. Guêp. Sol. Suppl.* p. 172, ♂; *Smith, Cat.* v, p. 45.

♀. Head and thorax closely and strongly, abdomen more finely and sparsely punctured, the punctures on the abdomen shallow; clypeus broadly pyriform, the apex with a short medial groove and two teeth; postscutellum prominent, projecting posteriorly, with the margin roughened and irregular; median segment vertical, concavo-truncate posteriorly, the truncation with a medial vertical groove impunctate but finely obliquely striate; abdomen with the basal segment not narrowed. Black; a spot between the antennæ and a line on the scape in front yellow, the apex of the flagellum beneath and the apical joints of all the tarsi fulvous red; the 2nd and following segments of the abdomen obscure orange-red, sometimes the apical margin of the 1st segment narrowly orange-red, or the base of the 2nd segment black; wings fuscous with a purple effulgence.

♂ similar; the clypeus and the front half of the scape of the

antennæ bright yellow; the legs somewhat lighter in colour; the abdomen in some specimens with a band of dusky stains down the middle of the 2nd and following segments.

Hab. Allahabad; Barrackpore; Pegu Hills, Burma; China. ♀. *Length* 17–19; *exp.* 37–40 mm. ♂. *Length* 14–16; *exp.* 34 mm.

630. **Rhynchium abdominale.**

Vespa abdominalis, *Illig. Mag. Ins.* i, p. 192.
Vespa transversa, *Fabr. Syst. Piez.* p. 257.
Rygchium dichotomum, *Sauss. Mon. Guêp. Sol.* p. 116, ♀ ♂.
Rygchium transversum, *Sauss. Mon. Guêp. Sol.* p. 117, ♀.
Rhynchium abdominale, *Sauss. Mon. Guêp. Sol. Suppl.* p. 172.
Rhynchium dichotoum, *Smith, Cat.* v, p. 45.

♀. Head and thorax densely punctured, granular; abdomen opaque, impunctate except for an irregular subapical band of coarse punctures on the posterior margins above of the 2nd–5th segments; clypeus convex, very broadly pyriform, the apex with two short acute teeth; postscutellum and median segment posteriorly truncate, the latter vertical, the sides bulging, the lateral lower angles dentate posteriorly; the basal segment of the abdomen cup-shaped, not narrowed. Head and thorax black; abdomen a dull orange-red, the basal segment with a transverse black apical band above, the 2nd segment with or without a transverse black spot in the middle of its apical margin above; wings dark fuscous with a purple effulgence.

♂ similar, smaller; the clypeus and sometimes a line on the front of the scape of the antennæ yellow; all the segments of the abdomen more or less dull black in the middle of their apical margins.

Hab. Throughout India, not ascending the hills to any elevation; Pegu, Burma. ♀. *Length* 15–17; *exp.* 33–37 mm. ♂. *Length* 12–14; *exp.* 29 mm.

631. **Rhynchium nitidulum.**

Vespa nitidula, *Fabr. Ent. Syst. Suppl.* p. 262.
Rygchium nitidulum, *Sauss. Mon. Guêp. Sol.* p. 105, ♀ ♂.
Rhynchium nitidulum, *Smith, Cat.* v, p. 43.

♀. Head and thorax very coarsely and closely punctured; abdomen smooth and satiny, with a few scattered shallow punctures and a subapical transverse line of the same, but somewhat coarser on the 2nd and 3rd segments; beyond the row of punctures the apical margins of the segments are depressed, smooth and shining; clypeus pyriform, the apex angularly incised, the sides on either side of the apex oblique and emarginate; scutellum and postscutellum gibbous; median segment strongly ridged along the sides; the sides flat, obliquely finely striate; the posterior face of the segment strongly concavo-truncate, with the sides produced back and spined. Black, somewhat thickly covered with silvery pile, which is very dense on the clypeus, the face in front, the

sides of the thorax, and on the abdomen; wings deep fuscous, with a purple effulgence broadly along the costal margin of the fore wing, the rest fusco-hyaline.

♂ similar, the base of the clypeus yellow.

Hab. Barrackpore, Bengal; Burma. ♀. *Length* 13–14; *exp.* 27–29 mm. ♂. *Length* 13; *exp.* 27 mm.

632. **Rhynchium metallicum.**

Rygchium metallicum, *Sauss. Mon. Guêp. Sol.* p. 114, ♀ ♂.
Rhynchium metallicum, *Smith, Cat.* v, p. 45.

♀. Head and thorax coarsely and closely punctured; abdomen satiny, smooth, and with sparse, fine shallow punctures; clypeus broadly pyriform, the apex truncate and slightly emarginate; scutellum and postscutellum slightly sloped, not oblique, the latter not gibbous; median segment short, concavely truncate posteriorly, the sides not produced, rounded. Black, covered with more or less of a thin silvery pile, especially on the clypeus, the front, cheeks, sides of the thorax, the median segment, the legs, and the sides of the abdomen; wings fusco-hyaline, broadly dark fuscous with purplish effulgence along the costal margin of the fore wing.

Fig. 104.
Rhynchium metallicum, ♀. $\frac{4}{3}$.

♂ similar, but with two oblique yellow spots sometimes joining and forming a band along the base of the clypeus.

Hab. Barrackpore; Rangit Valley, Sikhim; Calcutta; Madras; Pegu Hills, Burma; Tenasserim. ♀. *Length* 12–13; *exp.* 25–26 mm. ♂. *Length* 10–11; *exp.* 25 mm.

633. **Rhynchium argentatum** *.

Vespa argentata, *Fabr. Syst. Piez.* p. 260.
Rygchium argentatum, *Sauss. Mon. Guêp. Sol.* p. 115, ♀ ♂.
Rhynchium argentatum, *Smith, Cat.* v, p. 45.

♀ ♂. Closely allied to and resembling *R. metallicum*, but constantly larger, the median segment slightly more rounded posteriorly, the silvery pile entirely absent, and the wings dark fuscous with a purple effulgence, not fusco-hyaline on the posterior half. In the ♂ the entire clypeus and the scape in front is yellow.

Hab. Sikhim; Malabar; Shevaroy Hills, Madras. ♀. *Length* 14–15; *exp.* 28–32 mm. ♂ slightly smaller.

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* The following species is described by Saussure from "Tranquebar," but has not, so far as I know, been procured of late years, and it may not be Indian:—

R. CARBONARIUM, *Sauss. Ann. Soc. Ent. Fr.* 1857, p. 317.

"Sat parvum, nigrum, depressum, ubique dense punctatum, clypeo truncato, postscutello haud crenato, metanoto valde bispinoso, supra canthis nullis, abdomen conicum, basi valde truncatum, suturâ indistinctâ, alæ nigro-violaceæ.

"Longueur totale 13 mm., aile 10 mm."

634. **Rhynchium bengalense,** *Sauss. Mon. Guêp. Sol. Suppl.* p. 176, pl. ix, fig. 8, ♂; *Smith, Cat.* v, p. 44.

♀. Head and thorax finely and closely punctured, abdomen smooth and satiny; clypeus strongly convex, broadly pyriform, with two short parallel carinæ on the anterior third, ending in two teeth at the apex; scutellum and postscutellum oblique, the former with a longitudinally impressed medial smooth line, the latter gibbous; median segment concavo-truncate posteriorly, a medial broad space, closely transversely striate, and divided by a narrow vertical furrow. Jet-black; the apical margins laterally of the 2nd–5th abdominal segments orange, on the 2nd segment the orange colour is continued along the sides of the dorsal plate forward; wings dark fuscous with a violet effulgence.

♂ similar, but the clypeus not carinate anteriorly, the apex emarginate; the clypeus and front of the scape of the antennæ yellowish white; the apical joint of the flagellum ferruginous.

Var. The orange markings on the 4th and 5th abdominal segments more or less obsolete.

Hab. Barrackpore, Bengal; Allahabad, N.W.P., and probably through Central India. ♀. *Length* 15–17; *exp.* 34–36 mm. ♂. *Length* 12–14; *exp.* 32–33 mm.

635. **Rhynchium flavomarginatum,** *Smith, Trans. Ent. Soc.* 1852, p. 35, ♂; *Sauss. Mon. Guêp. Sol. Suppl.* p. 177.
Odynerus nigrifrons, *Smith, Cat.* v, p. 62.
Rhynchium basimacula, *Cam. Mem. Manch. L. Ph. Soc.* xli (1897).

♀. Head and thorax somewhat coarsely and very closely, abdomen more finely and sparsely punctured, the punctures on the 2nd–5th segments coarser posteriorly, forming a distinct subapical band above; clypeus broadly pyriform, the apex with a medial vertical short groove and ending in two prominent teeth; antennal carina short but distinct; postscutellum gibbous, projecting posteriorly, the margin roughened; median segment vertical, concavo-truncate posteriorly; abdomen with the basal segment not narrowed. Black; a spot between the antennæ, a line on the front of the scape, an interrupted line (sometimes absent) on the pronotum, a spot on each side of the median segment posteriorly (absent in the type specimen), and a broadly interrupted narrow subapical line on the posterior margins of the 1st and 2nd abdominal segments above yellow or yellowish white; the apical joint of the anterior tarsi fulvous, the femora at apex more or less ferruginous; wings fusco-hyaline, beautifully iridescent in certain lights.

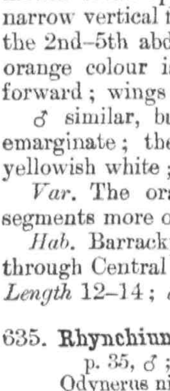


Fig. 105. *Rhynchium flavomarginatum*, ♀. ½.

♂ similar, the greater part of the clypeus and a line on the anterior tibiæ above yellowish white.

Hab. Sikhim; Mussooree, N.W. Himalayas; China. ♀. *Length* 13–17; *exp.* 34–40 mm. ♂. *Length* 13–14; *exp.* 33–36 mm.

636. **Rhynchium flavolineatum.**

Odynerus flavolineatus, *Smith, Cat.* v, p. 60, ♀.

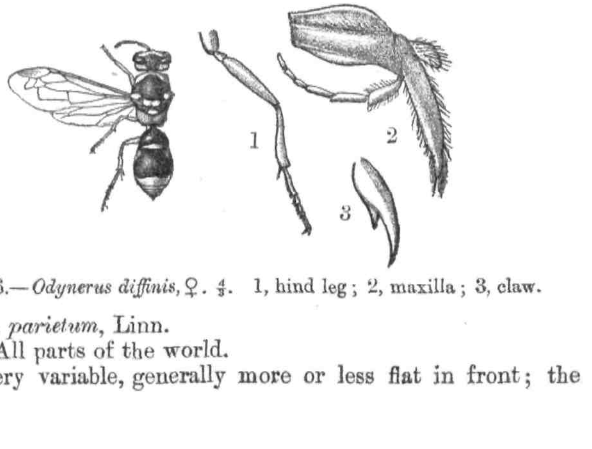
♀. Head, thorax, and abdomen closely punctured, the punctures on the pro- and mesonotum fine and dense, giving them a granular appearance, on the posterior margins of the segments they are somewhat coarser; clypeus convex, broadly pyriform, nearly pentagonal, the apex slightly emarginate; postscutellum and median segment roundly truncate posteriorly, the latter depressed vertically beneath the former, the sides bulging laterally and minutely dentate, the truncation with a carina down the middle and faint transverse striæ; abdomen with the basal segment cup-shaped, not narrowed. Black; the clypeus, a spot above it and one in the emargination of the eyes, a line behind them, the scape in front, the pronotum anteriorly, the tubercles, a spot on the mesopleuræ, the tegulæ and a spot behind them, two abbreviated lines on the mesonotum posteriorly, the postscutellum, a large subovate spot on the sides of the median segment, a spot on the intermediate and posterior coxæ, a broad stripe on the anterior and intermediate femora in front, the tibiæ on the outside, the claw-joint of the anterior tarsi, and the posterior margins of the 1st–5th addominal segments, yellow; wings fusco-hyaline, the costal margin of the fore wing dark fuscous.

Var. The abbreviated lines on the mesonotum and the spots on the intermediate and posterior coxæ absent.

Hab. Rangit Valley, Sikhim; Tenasserim; Java. ♀. *Length* 13-15; *exp.* 30–34 mm. ♂ unknown.

Genus ODYNERUS.

Vespa, pt., *Linn. Syst. Nat.* i, p. 948 (1767).
Epipona, *Latr. Hist. Nat. Ins.* xiii, p. 349 (1805).
Odynerus, *Latr. Hist. Nat. Ins.* xiii, p. 344 (1805).
Symmorphus, *Wesm. Mon. Odyn. Belg.* p. iii (1833).
Ancistrocerus, *Wesm. t. c.* p. iv (1833).
Oplopus, *Wesm. t. c.* p. iv (1833).



106.—*Odynerus diffinis*, ♀. $\frac{4}{3}$. 1, hind leg; 2, maxilla; 3, claw.

Type, *O. parietum*, Linn.

Range. All parts of the world.

Head very variable, generally more or less flat in front; the

parts also variable: the antennæ in the majority of species rather short, filiform, the apical joints in the male with a small hook, or spirally rolled; mandibles blunt with blunt teeth, never long as in *Eumenes*; labial palpi stout, 4-jointed, and covered with stiff hairs; maxillary palpi 6-jointed, diminishing in length to the apical joint, which, however, is sometimes longer than the 5th joint, the apical three joints united, distinctly longer than the 3rd. Thorax rounded or truncate both anteriorly and posteriorly, in a few species emarginate posteriorly; legs short, somewhat feeble and slender, intermediate tibiæ with one apical spine; claws dentate. Wings: in the fore wing the form and proportions of the radial and cubital cells are variable; in general, however, the radial cell is widely subtriangular, the apex acute, or slightly truncate and appendiculate; three cubital cells, the 2nd receiving both recurrent nervures. Abdomen of variable shape, the basal segment often narrowed, but never fashioned into a long petiole as in *Eumenes*, always more or less covering over the base of the 2nd segment.

The genera *Rhynchium* and *Odynerus* are only clearly separable by an examination of the mouth-parts, as noted in the key to the genera. Externally the two genera resemble each other and grade one into the other astonishingly. Roughly, however, the species of *Rhynchium* are larger, heavier built insects than the species of *Odynerus*. Both genera can at once be distinguished from *Eumenes* by the form of the basal abdominal segment, which is never narrowed into an elongate petiole, but, though often constricted and narrower than the 2nd segment, always receives and more or less covers over the base of the latter.

The species of *Odyneri* make sometimes little thin clay shells for nests, but more often make use of crevices and holes for their nurseries, storing as food for their larvæ the caterpillars of various species of small moths. I have never found them attacking or storing spiders or other prey.

Key to the Species.

A. First abdominal segment with one, sometimes two transverse sutures near the base.	
a. Colours black and red	*O. sikhimensis*, p. 363.
b. Colours black and yellowish white........	*O. sichelii*, p. 363.
c. Colours yellow and ferruginous brown	*O. amadanensis*, p. 364.
B. First abdominal segment without a suture.	
a. Colours reddish or ferruginous and yellow.	
a'. Margins of all the abdominal segments more or less yellowish..............	*O. ornatus*, p. 364.
b'. Second to fourth abdominal segments yellow	*O. punctatipennis*, [p. 365.
c'. Second abdominal segment only yellow, rest reddish brown	*O. punctum*, p. 365.
b. Colours black and yellow, or black and yellow and red.	

- *a*′. Second abdominal segment with a lateral *free* round spot at base, yellow.
  - *a*². Base of 1st abdominal segment red.
    - *a*³. Abdomen petiolate .... *O. miniatus*, p. 366.
    - *b*³. Abdomen not petiolate .... *O. diffinis*, p. 366.
  - *b*². Base of 1st abdominal segment black.
    - *a*³. A lateral round yellow spot at base of 1st abdominal segment.
      - *a*⁴. Median segment rounded posteriorly .... *O. fraternus*, p. 366.
      - *b*⁴. Median segment emarginate posteriorly .... *O. confluentus*, p. 367.
    - *b*³. No lateral yellow spot at base of 1st segment.
      - *a*⁴. First abdominal segment much narrowed, subpetiolate ...... *O. fragilis*, p. 367.
      - *b*⁴. First abdominal segment not narrowed, broader than long.
        - *a*⁵. Apical margins of abdominal segments 1–5 with complete transverse yellow bands above .... *O. multipictus*, p. 368.
        - *b*⁵. Apical margins of 1st and 2nd abdominal segments only with complete transverse yellow bands above.
          - *a*⁶. Head, thorax, and basal three segments of the abdomen coarsely punctured ...... *O. ceylonicus*, p. 368.
          - *b*⁶. Head, thorax, and abdomen with much finer punctures. *O. bipustulatus*, [p. 369.
- *b*′. Second abdominal segment with the yellow transverse band at its apical margin widening laterally and joining on to the lateral yellow spot at its base.
  - *a*². Head emarginate posteriorly, cheeks not much developed .... *O. ovalis*, p. 369.
  - *b*². Head transverse posteriorly, cheeks considerably developed .... *O. guttatus*, p. 370.
- *c*′. Second abdominal segment without a yellow lateral spot.
  - *a*². Median segment deeply emarginate posteriorly, the sides produced backwards......................... *O. fistulosus*, p. 370.
  - *b*². Median segment not emarginate posteriorly.
    - *a*³. Second abdominal segment subtuberculate near the base, and on each side near the margin above . *O. humbertianus*, [p. 371.
    - *b*³. Second abdominal segment not tuberculate above.
      - *a*⁴. Third abdominal segment with a transverse yellow fascia on the middle of its posterior margin above...................... *O. burmanicus*, p. 371.

b^4. Third abdominal segment without any yellow border.	
a^5. First abdominal segment petiolate......................	*O. icarioides*, p. 372.
b^5. First abdominal segment not petiolate.	
a^6. Wings blackish	*O. tinctipennis*, p. 372.
b^6. Wings cinereous	*O. intendens*, p. 373.

637. **Odynerus sikhimensis**, n. sp. (Pl. II, fig. 12.)

♀. Head, thorax, and abdomen punctured and thinly pubescent, the punctures rather coarse and closely set on the head and thorax, more sparse and shallow on the abdomen; clypeus very convex and broadly pyriform, the apex emarginate; the post-scutellum transverse posteriorly, not projecting, the median segment depressed vertically below it and slightly concavo-truncate, the angle between the sides and the truncation with a vertical carina; basal segment of abdomen only very slightly narrowed, steeply sloped or truncate anteriorly. Black, the pubescence fuscous; a line on the pronotum, the tubercles, the apical margin of the 1st abdominal segment above and of the 2nd above and below deep brick-red; wings very long and ample, light fuscous with a purple effulgence, the base of the hind wing hyaline.

Hab. Rangit Valley, Sikhim, 1000 ft. ♀. *Length* 9–11; *exp.* 28 mm. ♂ unknown. Type in the coll. British Museum.

638. **Odynerus sichelii**, *Sauss. Mon. Guêp. Sol. Suppl.* p. 206, ♀, pl. x, fig. 6; *Smith, Cat.* v, p. 58.

♀. Head and abdomen finely and rather sparsely punctured, the head pilose in front, the vertex smooth, the punctures shallow; thorax much more closely and strongly punctured, granular; clypeus very broadly pyriform, the apex with two distinct short longitudinal carinæ, forming slightly projecting teeth; scutellum and postscutellum long, declivous; median segment long, truncate posteriorly; 1st abdominal segment compressed, narrowed, campanulate, bearing two transverse distinct sutures close to its base above, 2nd segment long, raised, and subtuberculate in the middle at base above. Black, shining; a curved line on the clypeus at base, a spot between the antennæ, a line on the scape of the same, a minute spot, sometimes absent, behind the eyes, a transverse band on the apical margin of the 1st abdominal segment above, and a slightly broader one on the apical margin of the 2nd above and below, white; legs black, with a few white marks; wings clear hyaline.

Hab. Sikhim; Barrackpore; Mussooree; Burma; Tenasserim. ♀. *Length* 8; *exp.* 16 mm. I have not seen a specimen of the male.

639. **Odynerus amadanensis,** *Sauss. Mon. Guêp. Sol. Suppl.* p. 214, pl. xii, fig. 9, ♂.

♀ ♂. Closely allied to and resembling *O. ovalis* (p. 369); differs primarily in belonging to the subgenus *Ancistrocerus*, Wesm., with a transverse suture on the basal abdominal segment, not *Lionotus*, Sauss., which has the 1st abdominal segment rounded and steep at base; it differs also considerably in markings. Head, thorax, and abdomen closely and somewhat coarsely punctured, on the abdomen, except along the margins of segments 1–4, the punctures are rather shallow; clypeus small, pentagonal, apex transverse or slightly emarginate; median segment not depressed vertically beneath the postscutellum, slightly sloping; the sides posteriorly rounded, with a rather deep medial longitudinal furrow; basal segment of abdomen narrowed and with a prominent transverse suture at base. Yellow; a large triangular spot on the vertex of the head, the mesonotum anteriorly and along the sides broadly, all the sutures between the parts of the thorax, an irregular spot at the base of the 1st abdominal segment, and a transverse band at the base of the 2nd segment, giving out a large square wedge-shaped mark in the middle posteriorly, and prolonged back on each side along the lateral margins of the segment, black or rusty rufescent black; wings clear hyaline.

Hab. Persia; Karáchi; the Punjab. ♀ ♂. *Length* 7–8; *exp.* 16–18 mm.

Mr. Cumming, who was kind enough to send me a small collection of hymenopterous insects from Persia, had a note to the effect that this species was a regular nuisance, coming into the house and stopping up keyholes etc. with clay.

*640. **Odynerus ornatus.**

Ancistrocerus ornatus, *Smith, A. M. N. H.* (2) ix (1852), p. 49, ♂.

"♂. Length 4½ lines (=10 mm.). Ferruginous, the clypeus and face as high as the top of the notch in the eyes, the scape of the antennæ in front, the mandibles and cheeks yellow; the stemmata are enclosed in a black coronet-shaped spot on the vertex; the margin of the prothorax, the tegulæ and posterior portion of the tubercles, the anterior and intermediate tibiæ and tarsi, also their coxæ in front yellow; the lateral margins of the scutellum and postscutellum, and also the margins of the collar stained more or less with yellow—all the impressed divisions of the thorax are stained more or less black; a dark fuscous spot occupies the marginal cell, extending a little beyond; abdomen, the apical margins of the segments are more or less of a yellowish tinge, as is also the 2nd segment beneath; the 2nd and 3rd segments above are black at their basal margins."

Hab. Bombay (*Smith*).

641. **Odynerus punctum.**

Polistes punctum, *Fabr. Syst. Piez.* p. 273.
Odynerus punctum, *Sauss. Mon. Guêp. Sol.* p. 209, pl. xix, fig. 2; *Smith, Cat.* v, p. 59.

♀. Head and thorax coarsely, abdomen more finely and sparsely punctured; clypeus broadly pyriform, convex, emarginate at apex; postscutellum very prominent and raised; median segment bulging laterally, rounded posteriorly; abdomen with the basal segment not narrowed. Brownish red, the antennæ obscurely orange-yellow, 2nd abdominal segment brighter yellow; the space between the ocelli, a narrow line on the apex of the mesonotum (sometimes absent), the base of the 2nd segment of the abdomen above broadly, and of the 3rd narrowly, black; wings hyaline, slightly ferruginous, with a fuscous subapical spot on the costal margin of the fore wing; 2nd cubital cell nearly triangular.

Fig. 107.
Odynerus punctum, ♂. $\frac{1}{1}$.

♂ similar; the clypeus, the front as high as the emargination of the eyes, a line on the scape in front, the posterior margin of the pronotum in the middle, the tegulæ, the lateral angles of the scutellum, the postscutellum obscurely, and the anterior and intermediate tarsi in front, bright yellow; the 2nd abdominal segment fulvous posteriorly.

Hab. Barrackpore, Bengal; Allahabad; Bangalore; Bombay. ♀. *Length* 10–11; *exp.* 23 mm. ♂. *Length* 9–10; *exp.* 22 mm.

642. **Odynerus punctatipennis**, *Sauss. Mon. Guêp. Sol.* p. 210, ♀; *Smith, Cat.* v, p. 59.
Odynerus intricatus, *Smith, Cat.* v, p. 59, ♂.

♀. Closely allied to and resembling *O. punctum*; differs from it chiefly and constantly in colour, and in the head and thorax being more coarsely punctured. Ferruginous brown, the head in front and the antennæ more or less orange-yellow; vertex with a Λ-shaped black mark truncated above; the pronotum anteriorly, the tegulæ, postscutellum, the legs, and the 2nd and 3rd abdominal segments yellow; the 2nd segment black at base, and with a large transverse spot, widest in the middle, ferruginous brown; wings flavo-hyaline, with a large subapical fuscous cloud in the fore wing.

♂ similar, but the black mark on the vertex larger; a transverse band on the apical margins of the 1st and 2nd segments of the abdomen and the whole of the visible portion of the following segments yellow, the band on the 2nd segment much enlarged laterally and with a black stain on its apical margin.

Var. ♀ ♂. The yellow markings much reduced or replaced with orange-brown.

Hab. Sikhim; Allahabad; Delhi; Bombay. ♀. *Length* 11–13; *exp.* 23–25 mm. ♂. *Length* 9; *exp.* 23 mm.

*643. **Odynerus miniatus,** *Sauss. Mon. Guêp. Sol. Suppl.* p. 249, pl. xi, fig. 6, ♀; *Dall. Torr. Cat.* ix, p. 79.

"♀. Clypeus pyriform, transverse anteriorly, with two longitudinal carinæ, the space between them punctured. Ocelli placed in pits. Metathorax convex, with an outwardly divergent carina on each side. Head and thorax punctured. Abdomen subpetiolate, the 1st segment elongate, bell-shaped, prominent above, about half the width of the 2nd segment; the latter swollen and tuberculate above. Black; the mandibles, a spot between the antennæ, the scape in front, the flagellum beneath, the outer orbits, a spot in the sinus of each eye, the clypeus (except an oval black spot in the middle), two spots on the prothorax, its entire margin, a spot under the base of the wings, the tegulæ (except a spot of red in the centre), the lateral angles of the scutellum and of the post-scutellum, the apical margin of the 1st and 2nd abdominal segments, and a free, round, lateral spot on the last, yellow; the base of the abdomen red, the anal segment brownish; legs red, femora and tarsi yellow; wings hyaline.

"*Hab.* India (*coll. F. Smith*). ♀. *Length* 6·5; *exp.* 12·5 mm."

644. **Odynerus diffinis,** *Sauss. Mon. Guêp. Sol. Suppl.* p. 274, pl. xiv, fig. 2; *Smith, Cat.* v, p. 59.

♀ ♂. Head, thorax, and abdomen finely and closely punctured, the thorax granular, the abdomen slightly shining; clypeus sub-pyriform, the apex incised; postscutellum slightly prominent, transverse posteriorly; median segment depressed beneath it, vertical; the sides rounded, a broad medial longitudinal furrow with a narrow carina down it; abdomen oval, the 2nd segment not narrowed, cup-shaped. Black; the mandibles, clypeus, a broad **Y**-shaped mark above it, the sinus of the eyes, a broad stripe behind them, the scape of the antennæ, a broad stripe on the pronotum, the tubercles, the tegulæ, the scutellum, post-scutellum, a large spot on each side of the median segment, another on each side at base of the 2nd abdominal segment, and the posterior margins of all the segments, bright yellow, the base of the 1st segment broadly deep red; legs yellow, the coxæ black, the femora, tibiæ, and tarsi touched with reddish ferruginous; wings light flavŏ-hyaline, with a brownish tint along the costal margin of the fore wing, and the apical two-thirds of the radial cell fuscous.

Var. The red on the basal segment of the abdomen reduced to a large patch on each side. Other specimens have the red spreading on to the sides of the median segment.

Hab. Sikhim; Barrackpore; Burma; Tenasserim. ♀. *Length* 8–9; *exp.* 18–20 mm. ♂. *Length* 8; *exp.* 17 mm.

645. **Odynerus fraternus,** n. sp.

♀. Closely allied to and resembling *O. confluentus*; differs in having the abdomen very sparsely punctured, nearly glabrous, the punctures fine and shallow; the clypeus very broad, grooved

at apex and ending in two distinct teeth; median segment more sloping, less concave posteriorly, the sides rounded; in colour *O. fraternus* differs in having a large black spot on the clypeus, no medial stripes on the mesonotum, and a free spot on each side of the basal abdominal segment.

Hab. Tenasserim. ♀. *Length* 10; *exp.* 24 mm. ♂ unknown. Type in the coll. British Museum.

646. **Odynerus confluentus,** *Smith, Cat.* v, p. 60, ♀.

♀. Head, thorax, and abdomen covered with elongate confluent punctures running into longitudinal striæ on the abdomen above; clypeus pyriform, raised, flat along the middle, the apex broad, transverse; the scutellum gibbous, its sides rounded; the median segment vertical, depressed underneath the postscutellum, concavo-truncate down the middle posteriorly, with a medial carina, the apical lateral angles of the segment acute; abdomen with the basal segment narrower than the 2nd, the posterior margins of all the segments narrowly smooth and shining. Black; the clypeus, a spot above it, the emargination of the eyes, a stripe behind them, a squarish spot on each side of the pronotum nearly meeting in the middle, the tubercles, a spot on the mesopleuræ, two parallel abbreviated lines on the mesonotum, the tegulæ, a spot at the lateral angles of the scutellum, the postscutellum, the median segment except a broad medial vertical black line, narrow subapical transverse bands on the margins of abdominal segments 1–5 above, an oblong spot along the sides of the basal and a round spot on the sides of the 2nd segment, yellow; legs yellow variegated with ferruginous; wings hyaline, fuscous along the costal margin, nervures fuscous, tegulæ with a fuscous spot.

Hab. Tenasserim; Sumatra. ♀. *Length* 12–14; *exp.* 28–30 mm. ♂ unknown.

647. **Odynerus fragilis,** *Smith, Cat.* v, p. 61, ♂.

♀. Head, thorax, and abdomen somewhat closely and coarsely punctured; clypeus broadly pyriform, its apex incised; postscutellum not or barely gibbous; median segment posteriorly with a deepish hollow traversed by a medial vertical carina; the basal abdominal segment much narrowed, very little more than half the breadth of the 2nd segment. Black; the clypeus except a waved transverse band across it, a spot above it, the emargination of the eyes, a line behind them, the scape of the antennæ in front, two large spots on the posterior margin of the pronotum not meeting in the middle, the tubercles, a spot on each side of the scutellum, another on each side of the postscutellum, a third larger and oval on the sides of the median segment posteriorly, the apical margins of the basal two abdominal segments, and a medial spot on the posterior margins of the apical two segments, yellow; the 2nd segment with a large round spot on each side at

its base; legs yellow, stained with ferruginous red; wings hyaline, with a fuscous subapical spot.

♂ similar, the yellow markings slightly broader, the flagellum of the antennæ fulvous beneath.

Hab. Burma; Tenasserim; Borneo. ♀. *Length* 6–7; *exp.* 16–18 mm. ♂. *Length* 5–6; *exp.* 16 mm.

648. **Odynerus multipictus.** (Pl. II, fig. 13.)
Smith, Jour. Linn. Soc. 1858, p. 112.

♀. Head and thorax with coarse confluent punctures; abdomen impunctate, opaque, smooth, not shining; clypeus slightly convex, flask-shaped, the apex truncate, narrow, the sides roundly emarginate; scutellum and postscutellum rather long, declivous; median segment truncate posteriorly, the sides rounded, not produced nor dentate; 1st abdominal segment not narrowed, cup-shaped. Black; the mandibles at base, the clypeus except a black central spot, a line from the anterior ocellus to between the bases of the antennæ, clavate below, a line on the front of the scape of the antennæ, the whole emargination of the eyes, a line behind them, a short oblique line on each side of the posterior ocelli, the pronotum in front, two fine abbreviated parallel lines on the disc of the mesonotum, the tegulæ, the tubercles, two spots often coalescing on the scutellum, the posterior lateral angles of the median segment, the legs, and a transverse band on the basal five segments of the abdomen, yellow; the legs variegated with black, the inside of the femora and tibiæ of the posterior legs ferruginous; wings subhyaline and iridescent, a subapical cloud and the costal margin of the fore wing fuscous.

Var. The two parallel yellow lines on the mesonotum absent.

Hab. Dehra Dun; Sikhim Terai; Burma; Tenasserim; Borneo. ♀. *Length* 9–10; *exp.* 22–23 mm. ♂ unknown.

649. **Odynerus ceylonicus,** *Sauss. Novara-Reise, Hym.* p. 12, ♀ ♂.

The *Odynerus* which I have, after careful comparison, identified, though with some doubt, as this species closely resembles *O. bipustulatus*, but is slightly smaller and has the basal abdominal segment narrower in proportion; the head, thorax, and abdomen are more coarsely punctured, the apical three segments of the latter being smooth. Black, with cinereous pile in certain lights; the mandibles, a spot on the front, the emargination of the eyes, a line behind them, a line on the scape of the antennæ in front, the base and margins of the clypeus, a spot on each side of the pronotum, a spot on the mesopleuræ, the tegulæ, a spot on each lateral angle of both scutellum and postscutellum, an abbreviated line on each side of the median segment posteriorly, a line on the posterior margins of the 1st, 2nd, and 4th segments of the abdomen, a spot in the middle of the apical margin of the 5th and a medial spot on the 6th segment, yellow; legs variegated with yellow, tarsi rufescent; wings hyaline, with a submarginal fuscous spot in the fore wing.

Hab. Ceylon (*Saussure*); Rangit Valley, Sikhim (*Möller*); Burma. ♀. *Length* 8–9; *exp.* 18 mm. I have not seen a male.

650. **Odynerus bipustulatus**, *Sauss. Mon. Guêp. Sol. Suppl.* p. 277, ♀ ♂, pl. xii, fig. 10.

♀. Head and thorax finely and densely, abdomen more sparsely punctured, the punctures shallow and large towards the posterior margins of the segments; clypeus nearly as broad as long, incised at apex; scutellum and postscutellum declivous, the latter not truncate; median segment depressed vertically beneath the postscutellum, truncate posteriorly, not concave, the sides rounded, transversely striate; abdomen with the basal segment not narrowed, cup-shaped. Black; a spot on each side of the base of the clypeus, a spot above it, another in the sinus of each eye, a line behind them, the scape of the antennæ in front, a large spot on each side of the pronotum in front, the tegulæ except a black spot in the middle, the tubercles, a spot on each side of the scutellum, another on each side of the postscutellum, a line on each side of the median segment, a complete transverse band on the apical margins of the basal two abdominal segments above, and a medial spot on the apical margins of the 4th and sometimes on the 5th and 6th segments also, yellow; legs black variegated with yellow, the anterior tibiæ and tarsi with ferruginous; wings hyaline, narrowly dark fuscous along the costal margin of the fore wing.

Fig. 108.—*Odynerus bipustulatus*, ♀. $\frac{2}{1}$.

♂ similar; the clypeus entirely yellow.

Hab. Delhi; Allahabad; Agra; Barrackpore; Burma; Tenasserim. ♀. *Length* 6–7·5; *exp.* 16–17 mm. ♂. *Length* 6; *exp.* 17 mm.

651. **Odynerus ovalis**, *Sauss. Mon. Guêp. Sol.* p. 215, ♂; *Smith, Cat.* v, p. 59.

♀ ♂. Head, thorax, and abdomen closely and somewhat coarsely punctured; the punctures at the bases of the abdominal segments slightly finer than along their apical margins; clypeus convex, subtriangular, scarcely pyriform, the apex truncate or very slightly emarginate; scutellum and postscutellum oblique, the latter not dentate or spined at the lateral angles; median segment rounded at the sides posteriorly, concavo-truncate down the middle to the apex, and bearing a vertically-impressed medial line; 1st abdominal segment steeply rounded at base, not narrowed. Black (rarely reddish); the mandibles except at apex, the clypeus, the emargination of the eyes, a triangular spot on the front above the base of the antennæ, the scape of the latter, a line behind the eyes, the sides of the pronotum not reaching the posterior angles,

the tubercles, a large spot below each of them, the tegulæ, the scutellum, postscutellum, and sides of the median segment broadly, and transverse bands on the posterior margins of all the abdominal segments, yellow; on the basal two segments the transverse band joins on laterally to large roundish yellow spots; in some specimens these spots are free, not joined to the transverse band; legs yellow, the coxæ and base of the femora black: wings hyaline and iridescent, slightly fuscescent along the costal margin and in the apex of the radial cell of the fore wing; 2nd cubital cell much narrowed at top and produced into an extremely acute angle towards the base of the wing below.

Var. With the yellow markings not so broad.

Hab. Throughout the plains of India; Punjab; Bombay; the Deccan; Madras. ♀ ♂. *Length* 6–9; *exp.* 13–17 mm.

652. **Odynerus guttatus.**

Ancistrocercus guttatus, *Smith, A. M. N. H.* ser. 2, ix (1852) p. 49.

♀. Closely allied to and resembling *O. ovalis*. The type specimen in the British Museum, which is the only one I have seen, differs from *O. ovalis* in having the occiput and cheeks more developed posteriorly, the occiput especially being transverse, not roundly emarginate as in *ovalis*. Black; the base of the mandibles, the clypeus, a wedge-shaped spot above it on the front, a line on the inner orbits joining a spot in the emargination of the eyes, the scape of the antennæ, a broad line behind the eyes, a large spot on each side of the pronotum meeting in the middle, the tegulæ, tubercles, scutellum, the middle of the postscutellum, an ovate spot on each side of the median segment, a line broadest in the middle on the 1st abdominal segment, the posterior margins broadly of the 2nd–4th segments, and a square spot in the middle of the 5th segment, yellow; there is a round yellow spot at the base of the 2nd segment, joined by a narrow line to the band on its margin; legs yellow, the coxæ, trochanters, and base of the femora black; wings hyaline, brownish yellow along the costal margin of the fore wing, and with a fuscous cloud in the radial cell.

Hab. Bombay. ♀. *Length* 8; *exp.* 20 mm. ♂ unknown.

653. **Odynerus fistulosus,** *Sauss. Novara-Reise, Hym.* p. 11, ♀.

♀. Head and thorax coarsely punctured, the punctures running into reticulations on the median segment, on the front and clypeus they are rather shallow; abdomen more sparsely and finely punctured; clypeus at apex slightly bidentate, scutellum with a medial longitudinal broad furrow, postscutellum not truncate posteriorly; median segment deeply emarginate posteriorly, the sides produced obtusely, the truncation smooth and finely, obliquely striate. Black, the abdomen in certain lights with a cinereous silvery pile; the base of the mandibles, a line on each side of the clypeus at base, a spot and a medial vertical line above the base of the antennæ, a spot in the emargination of the eyes, a line behind

them, an interrupted line on the pronotum, the tegulæ, a spot on the mesopleuræ, a submarginal transverse band on abdominal segments 1–5, and lateral spots on the 1st and 2nd ventral segments, yellow; the sides of the median segment posteriorly narrowly rufescent; legs black variegated with yellow, the tarsi reddish; wings fusco-hyaline and iridescent.

Var. With the yellow markings much reduced and more or less obsolete, especially on the abdomen.

Hab. Pundaloya (*Green*), Ceylon. ♀. *Length* 10; *exp.* 22 mm. ♂ unknown.

654. **Odynerus humbertianus,** *Sauss. Novara-Reise, Hym.* p. 13, ♀ ♂.

♀. Head thorax, and basal three segments of the abdomen coarsely and closely punctured, rest of the abdomen smooth; clypeus very long and pyriform, margined off by a carina on each side and longitudinally rugose striate between the carinæ; median segment with a broad sulcation down the middle which is not smooth but punctured, the apex below with a longish spinous tooth on each side; abdomen with the basal segment narrowed, the 2nd segment with a conspicuous conical elevation close to the base in the middle above, and a smaller one submarginally on each side. Black, in certain lights appearing covered with a thin cinereous pile; the base of the mandibles, a line on each side of the clypeus at base, a spot (sometimes a vertical line) above the clypeus, the emargination of the eyes, a line behind them, two contiguous spots on the posterior margin of the pronotum, a spot on the posterior part of the tegulæ, a spot at the lateral angles of the scutellum, sometimes absent, a line on the postscutellum, the apical teeth on the median segment, a transverse band on the apical margins of the basal two abdominal segments, with two contiguous spots or an abbreviated line on the posterior margins of the 4th and 5th segments in the middle above, yellow; legs reddish or black variegated with yellow; wings hyaline and iridescent.

♂ similar; clypeus without carinæ, bidentate at apex and yellow; 6th segment also with an interrupted marginal yellow line.*

Hab. Udagama, Ceylon (*Green*); Sikhim (*Möller*); Burma; Tenasserim. A common species. ♀. *Length* 8–10; *exp.* 18–22 mm. ♂. *Length* 7–8; *exp.* 16–19 mm.

655. **Odynerus burmanicus,** n. sp.

♀. Form stouter and broader in proportion to length than any *Odynerus* known to me. Head, thorax, and abdomen punctured, closely and coarsely so on the head and thorax, more sparsely with the punctures more shallow on the bases of the abdominal

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* Maindron describes a species unknown to me briefly as follows:—

"*Odynerus ponticerianus.* Niger, nitidus, grossis punctis, toto corpore corrugato. Alis hyalinis. Abdominis segmentis primo atque secundo tenuis vittis flaviscentibus marginalis.

"*Hab.* Pondicheri. Long. 7 mm."—Ann. Soc. Ent. Fr. 1882, Bull. p. xv, ♀ ♂.

segments; apical segment dull, opaque, impunctate; clypeus convex, as broad as long, with the base transverse, the apex narrowed and emarginate; scutellum and postscutellum large and prominent, the latter projecting posteriorly; median segment very broad, truncate posteriorly, with the sides rounded; abdomen short, stout, massive, the basal segment cup-shaped. Black; the basal half of the clypeus, a spot above it, a spot in the emargination of the eyes, an obscure spot behind them, a medially interrupted line on the pronotum, the tegulæ except a transverse testaceous streak in the middle, a spot at each lateral angle of the postscutellum, and a transverse fascia on the apical margins of the basal three segments of the abdomen, yellowish white; legs ferruginous, with the coxæ fuscous black and a streak on the outer side of all the tibiæ yellow; wings clear hyaline, very slightly fuscescent in the radial cell of the fore wing.

Hab. Rangoon; Toungoo; Pegu. ♀. *Length* 8–10; *exp.* 18–22 mm. ♂ unknown.

656. **Odynerus icarioides,** n. sp.

♀. Head, thorax, and the basal four segments of the abdomen finely and closely punctured, the apical two abdominal segments smooth, dull and opaque; clypeus convex, subtriangular, the apex of the triangle turned downwards and truncate or slightly emarginate; median segment slightly sloped, with a medial deep furrow, the sides posteriorly on each side of the furrow rounded; abdomen petiolate, the basal segment shaped almost as in *Icaria*. Black; the base of the mandibles, a spot on each side at the base and the

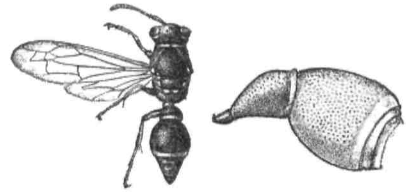

Fig. 109.—*Odynerus icarioides*, ♀. ½.

apex of the clypeus, the base of the scape of the antennæ in front, a line on the pronotum, the tegulæ, a spot at each lateral angle of the postscutellum, a line on the fore legs anteriorly, the apex beneath of the intermediate femora, and a transverse band on the posterior margins of the basal two abdominal segments, yellow; wings fusco-hyaline, darkening along the anterior margin of the fore wing.

Hab. Tenasserim. ♀. *Length* 11; *exp.* 24 mm.

*657. **Odynerus tinctipennis,** *Walk. A. M. N. H.* (3) v, 1860, p. 304.
Ancistocerus tinctipennis, *Motsch. Bull. Soc. Nat. Mosc.* 1863, p. 23.

♀. "Black, roughly punctured. Head with a short yellow line

behind each eye; clypeus finely punctured, with a yellow spot on each side. Prothorax with a transverse attenuated line which is interrupted in the middle. Two yellow dots at the base of each fore wing, the hind one divided. Metathorax with a short transverse yellow line. Abdomen finely punctured hindward; 1st and 2nd segments with yellow hind borders. Anterior femora with a yellow apical stripe on the outer side. Wings blackish, veins and stigma black. Length 5 lines (=11 mm.), wings 8 lines (=nearly 18 mm.)."

Hab. Ceylon.

*658. **Odynerus intendens,** *Walker, A. M. N. H.* (3) v (1860) p. 304.
Ancistocerus intendens, *Motsch. Bull. Soc. Nat. Mosc.* 1863, p. 23.

♀. "Black, roughly punctured. Head with a red point behind each eye and with another in the notch of each eye, a pale point between the antennæ, which are reddish beneath at the tips; clypeus thinly punctured, with a curved transverse piceous line at its base; scape yellow beneath. Abdomen smooth towards the tip, 1st and 2nd segments with whitish hind borders. Tibiæ and tarsi beneath and knees reddish, fore tibiæ yellow on the inside. Wings cinereous, veins and stigma black. Second submarginal areolet divided by an additional veinlet. Length 4 lines (= about 9 mm.), wings 6 lines.

Hab. Ceylon. I have failed to identify this species.

Genus PTEROCHILUS.

Pterochilus, *Klug, Beitr. z. Naturk. v. Weber und Mohr*, i, p. 143 (1805).

Type, *P. pallasii*, Klug.

Range. Both hemispheres.

Head slightly concave posteriorly; eyes rather small in proportion, reaching down to the base of the mandibles; ocelli small, placed in a triangle on the summit of the vertex; clypeus roundly angular at base; mandibles large and powerful, crossing each other behind the clypeus, and ciliated on the outer side with fine hairs; labium long; labial palpi longer than the lingua, 3-jointed, the apical two ciliated with long hairs; maxillary palpi of 6 joints. Thorax ovate, somewhat angular in front; the median segment very steeply sloped, but not vertical, the medial furrow ill-defined; legs long and stout in proportion, intermediate tibiæ with one apical spur: wings ample, radial cell of fore wing broad, acute and elongate at apex, 1st cubital cell long, about equal to the 2nd and 3rd united, 2nd subtriangular, the 3rd higher than long, subquadrate. Abdomen, the basal segment

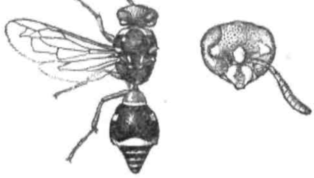

Fig. 110.
Pterochilus pulchellus, ♀. $\frac{2}{1}$.

subpetiolate, cup-shaped, receiving and covering the base of the 2nd segment, 2nd very large and as broad as it is long.

I know of only one species of *Pterochilus* occurring in India, *P. pulchellus*, Smith, the habits of which have been well described by Horne (Trans. Zool. Soc. vii, p. 168). It builds little cells of finely-worked clay for nests, and fills them with minute spiders.

659. **Pterochilus pulchellus**, *Smith, Trans. Zool. Soc.* vii, p. 190, pl. xxi, figs. 8, 8 *a* (nest), & 8 *b*.

♀. Head, thorax, and abdomen punctured, the punctures on the head and thorax close and fine, the surface with a granular look, on the abdomen the punctures are shallow; clypeus convex, subtriangular, the apex produced and rounded; thorax ovate, deep, the scutellum and postscutellum not particularly prominent; the median segment with a steep slope, but not vertical, its sides compressed, posteriorly with a lateral edge or angle and a medial somewhat broad furrow; basal abdominal segment narrowed, subpetiolate. Black; the basal abdominal segment light ferruginous red; the clypeus, except a fuscous streak down the middle, a spot above it, another in the emargination of the eyes, a line behind them, the front of the pronotum, the tegulæ, a spot on the mesopleuræ, the lateral angles of the scutellum and postscutellum, a transverse band on the apical margins of the 1st and 2nd abdominal segments, a round spot on each side near the base of the latter, and elongate transverse spots on the apical margins of the 4th and 5th segments, with a spot in the middle of the apical segment above, yellow; legs yellow, with slight ferruginous stains; wings hyaline and iridescent.

♂ similar; clypeus immaculate, the lateral spots on the 2nd abdominal segment wanting.

Hab. Mainpuri; Allahabad, N.W. Provinces. ♀. *Length* 7–8; *exp.* 11 mm. ♂. *Length* 6; *exp.* 11 mm.

Genus ALASTOR.

Odynerus, pt., *Guér. Voy. Coq., Zool.* ii, pt. 2, p. 266 (1838).
Alastor, *Lepel. Hym.* ii, p. 668 (1841); *Sauss. Mon. Guêp. Sol.* p. 249, pl. vi, fig. 4 *a*, 4 *b*, 4 *c*, & pl. vii, fig. 6 *a*, 6 *b*, 6 *c*, 6 *d*.

Fig. 111.—*Alastor variolosus*, ♀. $\frac{3}{1}$.

Types, *A. clotho* and *A. atropos*, Lepel.

Range. South America; Australia; Ceylon.

Characters those of *Odynerus*, except the following:—labium with the median lobe divided; labial palpi of four joints, the 1st inflated at the end, the 4th very minute; maxillary palpi with six joints, the 1st thickened, the others slender; mandibles acute, with four lateral teeth; fore wing with the 2nd cubital cell petiolate.

Only one species is known within our limits, and that is from Ceylon.

660. **Alastor variolosus**, n. sp.

♂. Head, thorax, and basal three abdominal segments strongly and very coarsely punctured; clypeus transverse, its anterior margin waved; antennæ inserted rather low down, just above the base of the clypeus; pronotum truncate anteriorly, the anterior lateral angles tuberculate; median segment roundly concavo-truncate posteriorly, divided by a medial longitudinal deep broad furrow, the posterior angles at apex with an upcurved tubercular spine; basal segment of abdomen cup-shaped, about half the length of the 2nd, which is deeply constricted at base, the constriction smooth and shining; apical four segments smooth, dull and opaque. Black; the clypeus, a line on the scape of the antennæ in front, a spot in the emargination of the eyes, a spot on each side of the middle of the pronotum posteriorly, the lateral angles of the postscutellum, and a narrow line on the apical margins of the basal two abdominal segments, yellow; legs variegated with yellow and rufous; wings hyaline, the radial cell slightly fuscescent, the nervures dark testaceous; the tegulæ very large, black, smooth and shining.

Hab. Trincomali, Ceylon. ♂. *Length* 7; *exp.* 12 mm. ♀ unknown.

Family VESPIDÆ.

Labium short, quadrilobed, the divisions corneous at apex; labial palpi with three or four, maxillary palpi with six, sometimes only five, joints. Mandibles, as a rule, short, armed with terminal teeth, except in the genus *Ischnogaster*, which has the mandibles long and not dentate; antennæ geniculate, arched, in *Ischnogaster* subclavate, of 12 joints in the ♀, 13 in the ♂; clypeus pentagonal or square, in *Ischnogaster* elongate; when pentagonal or lengthened ending in a point, when square, anteriorly emarginate, sometimes bilobed; eyes not always reaching down to the base of the mandibles, the inner orbits with a sinus or emargination. Thorax variable, the posterior angles of the pronotum reaching back to the base of the wings; median segment always more or less convex; legs with the tibiæ armed at apex with *two* spines; claws simple *. Wings when in repose with a longitudinal fold; fore wing with one radial and two, three, or four cubital cells, *the 2nd cubital cell, without exception, receiving both recurrent nervures; 1st discoidal cell considerably longer than the 1st submedial cell.* Abdomen variable.

* *Ischnogaster*, which seems to me a link between the *Eumenidæ* and *Vespidæ* both in structure and habits, has two apical tibial spines, but the claws are unidentate at base below.

Key to the Genera.

A. First abdominal segment narrowed into a petiole.
- *a.* Fore wing with 3 or 4 cubital cells.
  - *a'.* Petiole much longer than the rest of the abdomen.
    - *a*². Mandibles and clypeus long beak-shaped, the former not dentate .. ISCHNOGASTER, p. 376.
    - *b*². Mandibles and clypeus short, the former with teeth at apex, the latter pentagonal .... BELONOGASTER, p. 381.
  - *b'.* Petiole shorter than or equal in length to the rest of the abdomen.
    - *a*². Median segment not steeply sloped, compressed towards the apex; mandibles with four teeth, all nearly equal in size .... POLYBIA, p. 382.
    - *b*². Median segment somewhat steeply sloped, not compressed towards the apex; mandibles with four teeth at apex, the inmost one smaller than the rest, acute.................. ICARIA, p. 385.
- *b.* Fore wing with only two cubital cells .. PARAICARIA, p. 392.

B. First abdominal segment not narrowed into a petiole, pseudosessile.
- *a.* Median segment always transversely striate; 1st abdominal segment fusiform towards the base .... POLISTES, p. 393.
- *b.* Median segment never transversely striate; 1st abdominal segment steep or roundly truncate at base .... VESPA, p. 399.

Genus ISCHNOGASTER.

Ischnogaster, *Guér. Voy. Coq., Zool.* ii, pt. 2, p. 269 (1838).

Type, *I. fulgipennis*, Guér.

Range. Neotropical, Oriental, and Australian regions.[1]

Head flat; eyes large, very prominent, the inner orbits on their upper half with a sinus, the sinus small and narrowed in the larger, deeper and broader in the smaller species; mandibles long and pointed, simple, without teeth, nearly always covered by the long acutely pointed clypeus; antennæ subclavate, the apical joint (♀) acutely conical, in the male forming a very small crotchet or hook applied closely against the 12th joint, their insertion high up just on a level, or a little below the sinus of the eyes. Thorax very short, globular, prothorax truncate anteriorly, not prolonged into a collar or neck; scutellum, postscutellum, and median segment forming a rounded, very steep, nearly vertical slope;

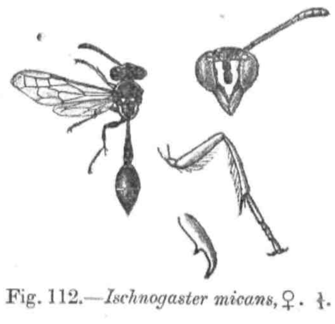

Fig. 112.—*Ischnogaster micans*, ♀. 1/1.

legs slender, nearly smooth; the intermediate tibiæ with a short anterior and very long posterior slender apical spine; tarsal claws unidentate in the middle below. Wings long, ample; radial cell of the fore wing long, narrow, acute at the apex, which reaches very nearly to the apex of the wing; four cubital cells, the 1st and 2nd subequal on the cubital nervure, the 2nd nearly forming a right-angled parallelogram, the 3rd square or nearly square, shorter than the 2nd, the 4th small, irregular, continued to the apex of the wing; the 2nd cubital cell receives both recurrent nervures close to its base and its apex respectively. Abdomen remarkable for its long thin petiole, which is nearly cylindrical with the apex suddenly clavate; in some species the base of the 2nd segment is also distinctly petiolate, in all it is attenuate, smaller than the apex of the first segment; 3rd and following abdominal segments forming a more or less acute cone.

The species of this genus seem to me to form the links between the Solitary and Social Wasps, as they not only combine the structural characters of the two families of the *Diploptera*, but different sections of the genus have different nesting-habits—the larger species making, as a rule, solitary nests constructed by one pair, ♂ and ♀; the smaller species living in a many-celled social nest in tiers constructed by the community. In the 'Journal of the Bombay Natural History Society' for 1890, vol. v, I figured the two nests.

Key to the Species.

A. Colours black, with yellow or red markings.
  a. Head and thorax black, with yellow markings.
    a'. Clypeus yellow, with an irregular square medial space black, not reaching its apex; median segment with a reversed T-shaped yellow mark on each side .... *I. micans*, p. 378.
    b'. Clypeus yellow, without a black medial space; median segment with a yellow spot on each side at apex .... *I. fraterna*, p. 378.
    c'. Clypeus black, with a small central yellow spot; median segment black immaculate .... *I. scitula*, p. 379.
  b. Head and thorax black with red markings .... *I. rufomaculata*, p. 379.
B. Colours rufescent brown or ferruginous with yellow markings.
  a. Median segment very finely transversely striate .... *I. nigrifrons*, p. 379.
  b. Median segment smooth.
    a'. Median segment with a vertically-impressed medial line; of comparatively small size. Length 12 mm... *I. nitidipennis*, p. 380.
    b'. Median segment without a vertically-impressed medial line; of comparatively large size. Length 17–18 mm. *I. eximia*, p. 380.

661. **Ischnogaster micans.** (Pl. III, fig. 1.)

Sauss. Ann. Soc. Ent. Fr. 1852, p. 24; *Mon. Guêp. Soc.* p. 8; *Smith, Cat.* v, p. 92.

Ischnogaster hauxwellii, *Bingh. Jour. Bomb. N. H. Soc.* viii (1893) p. 386, pl. i, fig. 4.

♀. Head, pro- and mesonotum finely and closely punctured, with a slightly granular appearance; scutellum, postscutellum, median segment, and abdomen smooth and shining; eyes distinctly divergent towards the vertex, front with a slight medial longitudinal carina; median segment convex, posteriorly with rather a steep slope. Black; the apical half of the clypeus, a broad stripe on each side on the upper half continued on the inner margin of the eyes up to the base of the antennæ, a spot in the emargination of the eyes, a spot above each antenna, another on each side of the vertex, the posterior margin of the pronotum broadly interrupted in the middle, an oval spot beneath the base of the wings, and a broad curved one beneath that, the inner half of the tegulæ, the lateral angles of the scutellum, a posteriorly emarginate line on the postscutellum, a reversed broad T-shaped mark on each side of the median segment, a spot on each side at the apex of the petiole of the abdomen, a large oval lateral spot near the base of the 2nd segment, a broad stripe at the base of the 3rd, a large lateral spot transversely along the bases of the 3rd and 4th segments, an elongate spot on each side in the middle of the 2nd ventral segment, and a round one on each side in the middle of the 3rd segment, yellow; the markings at the bases of segments 2–4 generally hidden; front legs yellow variegated with black, intermediate and posterior legs black, yellow on the coxæ posteriorly and reddish fulvous at the knees; wings hyaline, fuscescent towards the apex and beautifully iridescent.

♂ similar, the wings slightly darker, and the yellow markings broader and more conspicuous.

Hab. Rangit valley, 1000 ft., Sikhim; Pegu Hills, Burma; Tenasserim; Java; Borneo. ♀ ♂. *Length* 16–18; *exp.* 30–33 mm.

662. **Ischnogaster fraterna,** n. sp.

♀ ♂. Closely allied to and resembling *I. micans*, Sauss. Differs in having the head and thorax more coarsely punctured, the clypeus not so long; it differs also constantly in the markings. Black; the clypeus except a narrow margin anteriorly and laterally, two oblique spots on the face below the antennæ, the posterior margin of the pronotum, a round spot under the base of the wing, a lunate spot under that, the lateral angles of the scutellum, a line on the postscutellum, a spot on each side at the apex of the median segment, the base of the 2nd abdominal segment, and a transverse band near the base of the 3rd, with a triangular submarginal spot on each side on its ventral surface, bright yellow; legs black or rufo-fuscous, the outside of the femora and the tibiæ above of the anterior legs yellow; wings fusco-hyaline, darker than in *I. micans*, and iridescent.

Hab. Tenasserim. ♀ ♂. *Length* 17–18; *exp.* 30–32 mm.

663. Ischnogaster scitula, n. sp.

♀. Head, thorax, and abdomen with a fine, very short, soft pubescence, noticeable on the vertex and front of the head, the sides of the median segment, and on the 2nd and following segments of the abdomen; head, pronotum, mesonotum, scutellum, and postscutellum coarsely and closely punctured, remainder of the body smooth; median segment convex posteriorly, with a distinct medially-impressed line. Black, shining, the pubescence silvery, a small spot on the clypeus, a line on the posterior margin of the pronotum in the middle, a small spot on the mesosternum, and the base of the 3rd abdominal segment above (generally hidden) yellow; the joints of the legs and the petiole of the abdomen dark rufo-fuscous; wings fusco-hyaline and iridescent.

Hab. Rangit Valley, Sikhim; Margherita, Assam (*Doherty*). ♀. *Length* 16–17; *exp.* 30–33 mm.

664. Ischnogaster rufomaculata, *Bingh. Jour. Bomb. N. H. Soc.* viii, 1893, p. 385, ♀.

♀ ♂. Closely allied to and resembling *I. micans* and *I. fraterna* (ante): differs in the clypeus being longer and much narrower and having a medial vertical carina at apex; the median segment is broader, less steep, and furnished with a small tooth on each side of the apex. The markings on the head and thorax are similar to those on the head and thorax of *I. micans*, but are red not yellow in all the specimens I have seen; while the markings on the abdomen are precisely similar to those of *I. micans* and like them bright yellow.

Hab. Tenasserim. ♀ ♂. *Length* 19; *exp.* 32 mm.

665. Ischnogaster nigrifrons, *Smith, Jour. Linn. Soc.* 1858, p. 113, ♀.

♀. Head, pro- and mesonotum, and scutellum closely punctured and finely granular; postscutellum and abdomen smooth, shining; median segment with a distinct but narrow medial vertical furrow, the sides posteriorly on each side of the furrow very finely obliquely striate; clypeus pentagonal, the apex produced and narrowed into a tooth. Dark ferruginous brown, the front and clypeus with rich golden pile; the base of the mandibles, the scape of the antennæ in front, the posterior margin of the pronotum, an oblique spot on each side of the mesonotum anteriorly, a large square spot at its apex (absent in the type specimen), a round spot at each lateral angle of the scutellum, the postscutellum, a largish spot on each side at the apex of the median segment, two spots one above the other on the mesopleuræ, another at the base of the metapleuræ, two contiguous lines at the base of the node of the petiole beneath, the lateral margins of the 2nd abdominal seg-

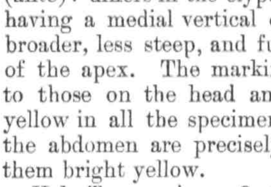

Fig. 113.—*Ischnogaster nigrifrons*, ♀. $\frac{4}{3}$.

ment, two oblique lines towards its apex beneath, a transverse band broadly interrupted in the middle at the base of the 3rd segment, a square spot on each side of the 3rd and 4th ventral segments, and the whole of the 6th ventral segment yellow; legs ferruginous brown variegated with yellow; wings hyaline, with a slightly brownish tinge and beautifully iridescent.

Var. The clypeus with a large cordate yellow spot, the anterior oblique and apical square spots on the mesonotum wanting; the intermediate and posterior coxæ yellow posteriorly.

Hab. Pegu Hills, Burma; Tenasserim; Borneo. ♀ or ☿? *Length* 11–12; *exp.* 19–22 mm. I have seen no ♂ of this species.

Common all over Tenasserim, makes a social nest (Jour. Bomb. Nat. Hist. Soc. 1890, pl. to paper on Hymenoptera, pp. 233–252).

666. **Ischnogaster nitidipennis,** *Sauss. Mon. Guêp. Soc.* p. 10, pl. xxxiv, fig. 4, ♂.

♀. Head, thorax, and abdomen thinly pubescent; clypeus nearly pentagonal, the apex lengthened and ending in a tooth; mesonotum nearly circular; scutellum and postscutellum prominent, raised; median segment convex posteriorly, nearly vertical, with a well-marked but fine and narrow medial longitudinal groove; petiole of the abdomen with the apex swollen, ellipsoidal, not gradually thickened; base of 2nd segment shortly petiolate. Ferruginous brown; the clypeus, a spot under the antennæ, the scape in front, the posterior margin of the pronotum, the anterior lateral angles of the scutellum, the postscutellum, a large spot on each side of the apex of the median segment, a spot at the base of the mesopleuræ, another at the base of the metapleuræ, a curved spot on the mesosternum, irregular marks on the sides of the median segment, two spots, one slightly above and in front of the other, on each side at base of the 2nd abdominal segment, two more elongate ones on its ventral side, a transverse band interrupted in the middle at the bases of the 3rd, 4th, and 5th segments, and the whole of the apical segment beneath, pale yellow; legs pale ferruginous variegated with yellow; wings clear hyaline, remarkably iridescent.

Var. A spot on the middle of the clypeus ferruginous brown, a spot on each side of the vertex of the head and a line behind the eyes yellowish; antennæ fulvous at their apex.

Hab. Cayenne??; Tenasserim. ♀. *Length* 12; *exp.* 20 mm.

667. **Ischnogaster eximia,** *Bingh. Jour. Bomb. N. H. Soc.* v, 1890, p. 244, pl. —, fig. 7, nest.

♂. Head, thorax, and abdomen thinly pubescent, the head, pro- and mesonotum, scutellum, and postscutellum, very minutely punctured; clypeus very long, anteriorly carinate down the middle; median segment nearly vertical, smooth. Dark rufo-ferruginous; the mandibles, clypeus, face as high as the base of the antennæ, the scape of the latter, a broad stripe on the posterior

margin of the pronotum, a spot beneath the base of each wing, a lunate spot below that, the tegulæ, the lateral angles of the scutellum, the postscutellum, a broad stripe on each side of the median segment, the legs, the petiole of the abdomen, the base of the 2nd, a medially interrupted band at the bases of the 3rd and 4th, and the whole of the 5th and following segments above testaceous yellow; beneath, the 2nd ventral segment has an elongate yellow spot on each side close to the base, and the 3rd ventral segment a large irregular lateral spot: the yellow markings on the abdomen are densely covered with golden pile; wings flavo-hyaline, darker along the costal margin of the fore wing.

♀ similar, but darker, the yellow markings narrower.

Hab. Ceylon (*Green*). ♀ ♂. *Length* 17–18; *exp.* 31–33 mm.

Genus BELONOGASTER.

Vespa, part., *Fabr. Ent. Syst.* ii, p. 279 (1793).
Zethus, part., *Fabr. Syst. Piez.* p. 282 (1804).
Rhaphigaster, *Sauss. Mon. Guêp. Soc.* p. 12 (1853) (*nec Lap. Hémipt.* 1833).
Belonogaster, *Sauss. Mon. Guêp. Soc., App.* p. 235 (1858).

Type, *B. juncea*, Fabr.

Range. Africa and India.

Head flat; eyes lengthened, each with a sinus on its inner margin above the middle, below their margin not reaching the base of the mandibles; ocelli in a long triangle on the vertex, the posterior ocelli close together; antennæ stout, filiform in the male, the apical three joints suddenly attenuate and convolute; clypeus wedge-shaped, the apex pointed; mandibles short, not forming a lengthened beak when closed, obliquely truncate at apex and armed with four teeth. Thorax compressed, rather deeper than long, more narrowed posteriorly than anteriorly; median segment sloping, without a medial furrow; legs very long, moderately stout; tarsi longer than the tibiæ, the 1st joint equal in length to the apical four, intermediate tibiæ with two spines at apex, the claws simple. Wings—fore wing with the radial cell elongate, very nearly attaining the apex of the wing; three cubital cells, the cubital nervure only faintly continued to the apex of the wing; the 1st cubital cell long, much longer than the 2nd and 3rd united, the 2nd the smallest, receiving both recurrent nervures and strongly constricted towards the radial cell, the 3rd forming a slightly

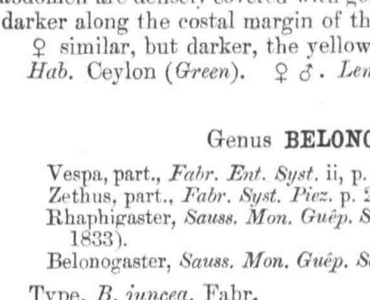

Fig. 114.—*Belonogaster indica*, ♀. 1/1.

elongate parallelogram; abdomen—basal segment lengthened into a petiole, with a strong tooth on each side in the middle and slightly thickening and depressed towards the apex; 2nd segment with the base petiolate, posteriorly campanulate, 3rd and following segments decreasing somewhat regularly in breadth and length.

668. **Belonogaster indica.**

Raphigaster indicus, *Sauss. Mon. Guêp. Soc.* p. 17, ♀.
Belonogaster indicus, *Smith, Cat.* v, p. 94.

♀ ♂. Head, thorax, and abdomen more or less pruinose, with a thin short silky pile; the head and thorax covered with evenly regular, sparse, and somewhat shallow punctures; eyes slightly divergent towards the vertex; scutellum and postscutellum prominent, the former square, the latter with a broad triangular hollow below it. Dark ferruginous brown, the 2nd abdominal segment with a yellow medially interrupted band on the margin of the 2nd segment continued entire beneath, 3rd and 4th segments blackish with their margins ferruginous brown, apical segments ferruginous brown; wings brownish hyaline with iridescent effulgence.

Var. Entirely ferruginous brown, no yellow border to the 2nd abdominal segment.

Hab. India (*Smith*); Bombay (*Saussure*); Madras. ♀ ♂. *Length* 18–24; *exp.* 38–49 mm.

Genus **POLYBIA.**

Polybia, *Lepel. Hym.* i, p. 533 (1836).
Rhopalidia, pt., *Lepel. t. c.* p. 538.
Myrapetra, pt., *White, A. M. N. H.* vii, p. 320 (1841).

Type, *P. indica*, Sauss.*

Range. North and South America, Africa, and the Oriental region.

Head flat; eyes elongate, the sinus on the inner orbits wide, the orbits below not reaching the base of the mandibles; antennæ long, filiform, inserted high up on the front; clypeus pentagonal, the apex ending in a tooth; mandibles with their apex nearly square; four large terminal teeth slightly slanting; ocelli complete, round, set in a triangle on the vertex. Thorax variable, in all the Indian species—compressed, especially the median segment, which is generally more sloping and less vertical than in any species of *Icaria*, rounded posteriorly and furrowed down the middle; legs long, slender, the intermediate

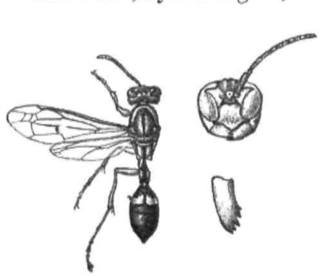

Fig. 115.—*Polybia indica*, ♀. ¾.

* This is the type of the species found in the Old World, subgenus *Parapolybia*, Sauss.

tibiæ with two spines at apex, the claws simple. Wings long; fore wing with the radial cell both broad and long, the apex sharply acute and reaching very nearly to the apex of the wing; the cubital nervure continued to the margin of the wing, hence four cubital cells—the 1st very large, about equal to the 3rd and 4th united; the 2nd very small, constricted towards the radial cell, receiving both recurrent nervures; the 3rd cubital cell a little larger than the 2nd and a little wider at apex than at base; the 4th a little smaller than the 1st. Abdomen petiolate, the petiole cylindrical at base, swollen and spherical at apex above; 2nd segment generally shortly petiolate at base, increasing in width to the apex; remaining segments gradually smaller, closing into the 2nd telescopically.

It is difficult to distinguish the insects belonging to this genus from those coming under the genus *Icaria*. So far, however, as the Indian species are concerned, they are slighter, more slenderly built than any of the *Icariæ*.

Key to the Species.

a. Mesonotum with two distinct parallel longitudinal stripes.
- *a'*. Of comparatively large size. ☿, length 11–12 mm. .... *P. orientalis*, p. 383.
- *b'*. Of comparatively small size. ☿, length 7 mm. .... *P. stigma*, p. 384.

b. Mesonotum without marks, or markings indistinct.
- *a'*. 2nd and 3rd abdominal segments with large lateral yellow spots; remaining segments immaculate .... *P. indica*, p. 384.
- *b'*. 2nd to 5th abdominal segments with transverse narrow yellow bands above.. *P. sumatrensis*, p. 385.

669. **Polybia orientalis**, *Sauss. Mon. Guêp. Soc.* p. 208, ☿, pl. xxvi, fig. 2; *Smith, Cat.* v, p. 133.

☿. Closely allied to *P. indica*, and resembling it greatly, but lighter in colour and with the yellow markings brighter and more profuse; *P. orientalis* is also constantly smaller. Light rufescent brown; the mandibles, the clypeus except a reddish-brown cloud in the middle, the space between the base of the antennæ, the sinus of the eyes and the inner and outer orbits broadly, a spot in front of the anterior ocellus, the scape and flagellum of the antennæ in front, the apical joints of the latter above, the prothorax except for a transverse streak in front and another on each side, two medial longitudinal parallel lines on the mesonotum, the scutellum, postscutellum, sides of the thorax, and median segment except in the sutures, two broad vertical

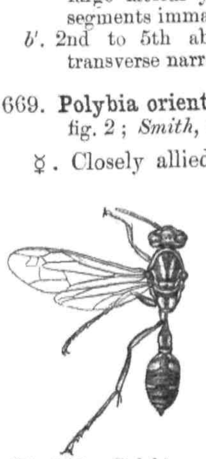

Fig. 116.—*Polybia orientalis*, ♀. $\frac{4}{3}$.

parallel streaks on the latter posteriorly, the legs except the base of the tibiæ above and the tarsi, a streak on each side of the petiole at base, and large lateral maculæ at the bases of the remaining abdominal segments, yellow; the spots on the 2nd segment with the middle reddish brown; wings hyaline, very slightly shaded with yellow on the costal margin of the fore wing.

♀ similar, very much larger; the abdomen very dark brown or black, with large lateral maculæ on the 2nd segment only; the median segment on the sides and posteriorly finely transversely striate.

Hab. Pegu Hills, Burma; Tenasserim; China. ☿. *Length* 11–12; *exp.* 26–28 mm. ♀. *Length* 20; *exp.* 40 mm.

670. **Polybia stigma,** *Smith, Jour. Linn. Soc.* 1858, p. 114, ♂.
Polybia decorata, *Smith, Jour. Linn. Soc.* 1858, p. 114, ♀.

☿. Head, thorax, and abdomen punctured and slightly pubescent, the punctures fine, shallow, and scattered; margin of the pronotum slightly recurved; scutellum and postscutellum prominent and raised; median segment moderately steeply sloped, the medial furrow narrow; petiole of abdomen short, subapically spherical above. Dark brown or black; the mandibles, clypeus, sinus of the eyes and the inner orbits, a spot on the front below the anterior ocellus, the cheeks, a transverse stripe on the vertex, the scape of the antennæ in front, the pronotum except the posterior lateral angles, two stripes on the mesonotum, the tegulæ and a spot on their inner side, the scutellum, postscutellum, and median segment, except a medial longitudinal line on the scutellum and the median segment, the sides of the thorax, except the sutures broadly, a line on each side of the petiole broadening towards but not reaching the apex, a large spot on each side of the base of the 2nd abdominal segment, the apical margins broadly of segments 2–5, and the whole of the 6th segment, yellow; beneath, the petiole and all the ventral segments entirely yellow; legs yellow variegated with brown; wings hyaline, the costal margin of the fore wing narrowly and the radial cell light fuscous.

♀ ♂. Differ only in being larger and in having the yellow marks narrower.

Hab. Pegu Hills, Rangoon, Burma; throughout Tenasserim; Malacca; Sumatra; Borneo. ☿. *Length* 7; *exp.* 17 mm. ♀. *Length* 10; *exp.* 20 mm. ♂. *Length* 9; *exp.* 18 mm.

671. **Polybia indica,** *Sauss. Mon. Guêp. Soc.* p. 207, ♀, pl. xxvi, fig. 3; *Smith, Cat.* v, p. 133.

♀ or ☿. Head, thorax, and abdomen very minutely and closely aciculate, making the surface dull and opaque looking; median segment with a steep slope posteriorly, medial furrow on it deep and opening above into a short transverse furrow below the postscutellum, the medial furrow itself obscurely transversely striate; the sides of the median segment smooth, compressed posteriorly,

rounded and bulging; petiole of abdomen subapically spherical above; the base of the 2nd segment shortly petiolate, the remaining segments depressed; the petiole not quite so long as the rest of the abdomen. Rufescent brown; the mandibles, the clypeus, except a brown vertical streak, a line on the scape of the antennæ in front, the anterior and posterior margins narrowly of the pronotum, the postscutellum, a spot on the tegulæ, two medial broad lines on the median segment, the sides of the latter, a spot at the base and an irregular mark on the lower half of the mesopleuræ, the coxæ and the femora beneath, the apical half of the tibiæ, and the apical joint of the tarsi with the claws, a line on each side of the petiole at base, and a large spot on each side of the 2nd and 3rd abdominal segments, yellow; the spots on the 2nd segment about the middle, those on the 3rd segment at the base and very often hidden by the margin of the 2nd segment; wings hyaline, iridescent, brownish along the costal margin of the fore wing.

Hab. Burma; Tenasserim; China. ☿. *Length* 13–14; *exp.* 30–32 mm.

672. **Polybia sumatrensis,** *Sauss. Rev. et Mag. Zool.* 1855, p. 374.

☿. Very slender; the median segment with a less steep slope than in the other Oriental species; the medial groove broad and more shallow, finely transversely striate; antennæ and legs proportionately longer. Very dark brown or black; the mandibles, clypeus, the inner orbits of the eyes and the sinus, the lower half of the cheeks, anterior and posterior margins of the prothorax narrowly, the tegulæ, the anterior margins of the scutellum and postscutellum, two broad parallel stripes on the median segment, an irregular mark on the mesopleuræ, the metapleuræ, a streak on each side of the median segment, and the apical margins above of the petiole and following three segments of the abdomen, yellow; legs yellow, the intermediate and posterior pair variegated with brown above and with the apical four joints of the tarsi entirely brown; wings hyaline, the costal margin of the fore wing lightly yellow.

Hab. Pegu Hills, Burma; Tenasserim; Sumatra. ☿. *Length* 11–12; *exp.* 30 mm.

Genus ICARIA.

Vespa, pt., *Fabr. Ent. Syst.* ii, p. 253 (1793).
Polistes, pt., *Fabr. Syst. Piez.* p. 269 (1804).
Epipona, *Lepel. (nec Latr.) Hym.* i, p. 540 (1836).
Rhopalidia, pt., *Guér. Voy. Coq., Zool.* ii, pt. 2, p. 266 (1838).
Anthreneida, pt., *White, A. M. N. H.* vii, p. 321 (184 .).
Icaria, *Sauss. Mon. Guêp. Soc.* p. 22 (1853).

Type, *I. maculiventris* (Guér.).

Range. Africa, Asia, and Australia.

Head flat, the clypeus pentagonal, the apex obtuse; eyes proportionately small, below not reaching the base of the mandibles; the inner orbits with a wide emargination or sinus; antennæ short, the flagellum slightly thickened beyond the basal portion of the second joint; ocelli small, complete, round, placed in a triangle on the vertex. Thorax deep; the prothorax square in front; the scutellum and postscutellum rather prominent; the median segment depressed almost vertically beneath the postscutellum: legs stout, long; the tibiæ smooth; the intermediate pair with two spines at apex: the claws simple. Wings moderately long, fore wing with the radial cell very broadly subtriangular; *three complete cubital cells, the 1st large, larger than* the 2nd and 3rd united, the 2nd very small, the 3rd often broader at apex than at base; the 2nd cubital cell receives both recurrent nervures. Abdomen: the 1st segment narrowed into a petiole, linear at base, curved, and then swollen at apex; the 2nd segment very large, bell-shaped, the 3rd and following segments folding into it telescope fashion. In one species the 2nd abdominal segment has its apical margin studded with spines.

Fig. 117.
Icaria guttatipennis, ♀. $\frac{5}{6}$.

The wasps belonging to this genus make, as a rule, small nests of from 5 or 6 to 40 cells, attached by a strong stout pedicel to twigs, the underside of leaves, rocks, walls of houses; and once I found a nest commenced on the corner of a pane of glass in a window; unfortunately, for some reason or other, the wasp (*I. variegata*) deserted this after completing only two cells.

Key to the Species.

A. Reddish or ferruginous brown, with yellow markings.

  a. Second abdominal segment with no transverse yellow band on its apical margin . *I. guttatipennis*, p. 387.

  b. Second abdominal segment with its apical half yellow .... *I. ferruginea*, p. 387.

  c. Second abdominal segment with a narrow yellow band on its apical margin above.

    a'. Base of 2nd abdominal segment without lateral yellow spots................ *I. marginata*, p. 388.

    b'. A yellow spot on each side at base of 2nd abdominal segment.

      a^2. Petiole of abdomen swollen and globular above near apex .... *I. variegata*, p. 388.

      b^2. Petiole of abdomen not swollen and globular above near apex .... *I. artifex*, p. 389.

B. Black, with red or yellow markings.

  a. Black, with petiole of abdomen red.

a'. Second abdominal segment ciliated with spines along its apical margin ..	*I. sumatræ*, p. 389.
b'. Second abdominal segment not so ciliated.	
*a*². Wings hyaline, fore wing with a fuscous cloud in radial cell	*I. speciosa*, p. 390.
*b*². Wings fuscous for half their length from base, flavo-hyaline on apical half	*I. ungulata*, p. 391.
b. Black, with petiole of abdomen black.	
a'. Second abdominal segment with a yellow transverse band on its apical margin	*I. aristocratica*, p. 391.
b'. Second abdominal segment without any yellow band.	
*a*². Third to fifth abdominal segments yellow	*I. aberrans*, p. 391.
*b*². Third to fifth abdominal segments black	*I. scitula*, p. 392.
C. Entirely black, without markings of any other colour	*I. formosa*, p. 392.

673. **Icaria guttatipennis.** (Pl. III, fig. 2.)
Sauss. Mon. Guêp. Soc. p. 40, ☿ or ♀, pl. v, fig. 8; *Smith, Cat.* v, p. 97.

♀. Head, thorax, and abdomen finely punctured and slightly pubescent; the vertex, the pro- and mesonotum granular, the abdomen with a smooth silky look: clypeus pentagonal anteriorly, with a fringe of fine, rather short hairs; median segment roundly sloping, with a carina on each side leading from the angle of the postscutellum, the two converging slightly towards the apex of the segment, the space between the carinæ slightly concave, medially furrowed down its lower half. Reddish brown; a line at the base of the mandibles and the anterior margin of the clypeus narrowly bright yellow; the metatarsi of the intermediate and posterior legs more or less yellowish; wings flavo-hyaline, with a broad subapical fuscous cloud on the fore wing; the whole insect covered with a thin silvery pile, only visible in certain lights.

Var. The abdomen very dark, nearly black, the apical margin of the petiole narrowly, and the basal two or three joints of the intermediate and posterior tarsi yellow.

☿ similar, smaller.

Hab. Rangoon, Pegu Hills, Burma; Tenasserim: Senegal; Port Natal; the Gambia. ♀. *Length* 18–19; *exp.* 30–33 mm. ☿. *Length* 12–13; *exp.* 22 mm.

674. **Icaria ferruginea.**
Vespa ferruginea, *Fabr. Ent. Syst.* ii, p. 280.
Polistes ferruginea, *Fabr. Syst. Piez.* p. 277.
Icaria ferruginea, *Sauss. Mon. Guêp. Soc.* p. 38, pl. v, fig. 6; *Smith, Cat.* v, p. 97.

♀. Head, thorax, and abdomen punctured and thinly finely

pubescent; pronotum with the anterior margin recurved and raised; median segment steeply sloped, furrowed narrowly down the middle, with a fine carina on each side running from the lateral angle of the post-scutellum, the two converging slightly towards the apex of the segment; the 1st abdominal segment petiolate, the petiole at apex spherical. Rufescent brown, the pubescence white; the apical margin of the clypeus, the postscutellum, a spot on each side at the apex of the median segment, a line (sometimes absent) on the posterior metatarsus above, a narrow transverse band on the apex of the petiole, and the posterior half of the 2nd abdominal segment above yellow, this last marking concave anteriorly and with a shading of black on the segment in front of it; wings flavo-hyaline, with a brownish tint and a subapical fuscous cloud on the fore wing.

Fig. 118.—*Icaria ferruginea*, ☿. 4/3.

☿ similar, the posterior margin of the pronotum sometimes narrowly yellow.

Hab. Barrackpore; Rangit Valley, Sikhim; Allahabad; Bombay; Poona; Madras; Ceylon; Burma; Tenasserim. ♀. *Length* 14–15; *exp.* 24–25 mm. ☿. *Length* 11–13; *exp.* 22–23 mm.

675. **Icaria marginata.**

Epipona marginata, *Lepel. Hym.* i, p. 541.
Icaria marginata, *Sauss. Mon. Guêp. Soc.* p. 237, ☿; *Smith, Cat.* v, p. 97.

♀. Head, thorax, and abdomen finely punctured and slightly pubescent, the vertex of the head, the pro- and mesonotum with a slight granular appearance; the abdomen smooth, silky; median segment with two convergent carinæ posteriorly, the space between them deeply furrowed down the middle and obscurely transversely striate. Light ferruginous brown all over, the 2nd abdominal segment darker and more obscure in the middle above, with a transverse band of yellow on the apical margin; all individuals have more or less the scutellum, postscutellum, and two marks close to the apex of the median segment yellow; in some these yellow markings are more decided than in others; wings flavo-hyaline, with a subapical fuscous cloud on the fore wing.

☿ similar, much smaller, usually without the yellow apical band on the 2nd abdominal segment, and always wanting the carinæ on the median segment.

Hab. Bangalore; Madras; Ceylon (*Green*). ♀. *Length* 15; *exp.* 26 mm. ☿. *Length* 9–10; *exp.* 18 mm.

676. **Icaria variegata.**

Epipona variegata, *Smith, A. M. N. H.* (2) ix (1852) p. 48.
Icaria variegata, *Sauss. Mon. Guêp. Soc.* p. 237; *Smith, Cat.* v, p. 97.
Icaria picta, *Sauss. Mon. Guêp. Soc.* p. 238.
Icaria pendula, *Smith, Cat.* v, p. 98, ♀.

♀ ☿. Very closely allied to *I. marginata*, of which the present may be an extreme variety; it differs only in colour as follows: ferruginous brown, the base of the mandibles, the clypeus, a spot between the base of the antennæ, the inner orbits and the sinus of the eyes, a line behind the eyes, the anterior and posterior margins of the prothorax, the tegulæ, the scutellum anteriorly, the postscutellum, two large oval marks on the median segment posteriorly, a spot beneath the base of each wing, the posterior margin of the petiole and of the 2nd abdominal segment, and a large spot on each side of the base of the last, yellow; legs ferruginous variegated with yellow; wings hyaline, with a small subapical cloud on the fore wing.

Hab. Poona, Bombay; Bangalore; Tenasserim. ♀. *Length* 9–10; *exp.* 20 mm. ☿. *Length* 5–6; *exp.* 13 mm.

677. **Icaria artifex**, *Sauss. Mon. Guêp. Soc.* p. 236; *Smith, Cat.* v, p. 98.
Icaria variegata, *Sauss.* (*nec Smith*) *Mon. Guêp. Soc.* p. 25, pl. iv, fig. 3, ☿.

♀ ☿. Head, thorax, and abdomen obscurely pubescent, the head, pro- and mesonotum, and scutellum finely granular; median segment glabrous, with a medial longitudinal furrow, vertical or very slightly sloped; petiole of abdomen gradually thickened to the apex, the latter not spherical. Black or rufescent brown; clypeus except a long, medial, vertical fuscous spot, the mandibles, a line on the front of the scape of the antennæ, a line on the posterior margin of the pronotum, sometimes the anterior also, the tegulæ, the scutellum and postscutellum, and a broad stripe down the middle of the median segment divided in two by the groove (sometimes an outer yellow longitudinal stripe also), a line on each side at the base of the petiole, a transverse line on its apex (sometimes obsolete), a large spot on each side at the base of the 2nd abdominal segment, and a transverse band on its apex yellow, the antennæ and the 3rd and apical segments of the abdomen ferruginous; legs reddish brown or black, the intermediate and posterior coxæ behind and the knees yellow; wings hyaline yellowish, with the stigma yellow along the costal margin of the fore wing, and a subapical fuscous cloud in the radial cell.

Var. The yellow markings more or less obsolete or replaced by fulvous or ferruginous.

Hab. Sikhim; Barrackpore; Dehra Dun; Mussooree; Pegu Hills, Burma; Tenasserim; Java. ♀. *Length* 12–13; *exp.* 25 mm. ☿. *Length* 10; *exp.* 20 mm.

678. **Icaria sumatræ.**
Vespa sumatræ, *Weber, Observ. Ent.* p. 103.
Anthreneida coronata, *White, A. M. N. H.* vii (1841) p. 321, footnote; *Sauss. Mon. Guêp. Soc.* p. 246, ♀; *Smith, Cat.* v, p. 100.

♀ or ☿. Very like *I. speciosa*, Sauss. Head, thorax, and abdomen very coarsely punctured, with a rugose granular appear-

ance; clypeus pubescent, flattish, somewhat longer than broad, pentagonal; median segment very steeply sloped, with a medial sulcation very wide at the top, bounded by a carina on each side, starting from the lateral angles of the post-scutellum and converging towards the apex, the sulcation with a medial deeply impressed line, the sides beyond the carinæ on each side obscurely rugose; petiole of abdomen as in *I. speciosa*; 2nd abdominal segment campanulate, the 3rd and following segments telescopically closing into it; from beneath the posterior margin of the 2nd segment a fringe of strong spines about 2 mm. in length projects over the base of the 3rd segment. Velvety black, the clypeus brownish with a whitish pile, the petiole of the abdomen red, black at base; the entire insect covered with a fine silky pile, looking golden in certain lights; the spines fringing the 2nd abdominal segment yellow; wings hyaline, the costal margin of the fore wing fuscous, and with a large fuscous subapical cloud from the radial cell to a little below the cubital cells.

Fig. 119.—*Icaria sumatræ*, ☿. $\frac{3}{1}$.

The type specimen of White's insect has the 2nd cubital cell very slightly petiolate towards the radial cell, receiving the 1st recurrent nervure about the middle, the 3rd cubital cell receiving the 2nd recurrent nervure near its base; but I am convinced this is only an individual variation: the specimens I procured in Tenasserim have the 2nd cubital cell as in *I. speciosa*, receiving both recurrent nervures.

Hab. Tenasserim. ☿. *Length* 11–12; *exp.* 19–23 mm.

The genus *Anthreneida* was founded by White on a single specimen without locality.

679. **Icaria speciosa,** *Sauss. Rev. & Mag. Zool.* 1855, p. 374; *Smith, Cat.* v, p. 98.

☿. Head, thorax, and abdomen finely punctured, densely pruinose, with a soft velvety appearance; clypeus convex, pentagonal, the apex ending in an obtuse angle; pronotum anteriorly rounded and distinctly narrowed towards the head; median segment vertical, with a wide, deep, medial vertical hollow, the sides rounded, smooth; petiole of abdomen spherical at apex, base of 2nd segment shortly petiolate. Intense black, the petiole orange-red, slightly fuscous at base, a spot at the base of the mandibles and the anterior margin of the clypeus narrowly white; wings light fusco-hyaline, darker along the costal margin of the fore wing, and with a fuscous subapical cloud.

Fig. 120.—*Icaria speciosa*, ☿. $\frac{2}{1}$.

Hab. Pegu Hills, Burma; Tenasserim; Malacca; Sumatra; Borneo (*A. Wallace*). ☿. *Length* 10–11; *exp.* 22–24 mm.

680. **Icaria ungulata,** n. sp.

☿. Closely allied to *I. speciosa* and resembling it, but smaller, more coarsely punctured, and with the wings of a different colour. Head, thorax, and abdomen rather coarsely but regularly punctured, densely pruinose, with a velvety appearance; clypeus convex, pentagonal, somewhat broader than long, the apex obtusely angled; pronotum anteriorly slightly rounded, not transverse, and distinctly narrowed towards the head; median segment vertical, furrowed down the middle, and obliquely coarsely striate; petiole with the apex spherical, the base of the 2nd abdominal segment shortly petiolate. Intense black, the petiole orange-red in its apical two-thirds; the antennæ beneath fulvous; the apical joints of all the tarsi, with the claws and pulvilli, and the margins of the 3rd and following abdominal segments bright testaceous; wings light fusco-hyaline for a little more than half their length from base, bright fulvous yellow beyond.

Hab. Tenasserim. ☿. *Length* 8–9; *exp.* 20 mm.

681. **Icaria aristocratica,** *Sauss. Mon. Guêp. Soc.* p. 37, ☿; *Smith, Cat.* v, 97.

☿. Head, thorax, and abdomen with very fine punctures, the surface not granular, finely silky and shining; clypeus pentagonal, apex with a strong downward bent tooth; pronotum wide, and with its anterior margin prominently recurved; median segment convex; petiole of abdomen short. Black; a line on the mandibles, the anterior margin of the clypeus, the inner orbits obscurely, a fine line along the anterior margin of the pronotum, a short line under the base of the wings; the postscutellum, the apical margin, and two obscure small spots on the petiole, and a broader transverse line on the posterior margin of the 2nd abdominal segment yellow; legs black, with a line of yellow on the posterior femora; wings hyaline, the radial cell of the fore wing entirely dark fuscous.

Hab. India (*Saussure*); Tenasserim; Pulo Penang. ☿. *Length* 7–8; *exp.* 16–19 mm.

*682. **Icaria aberrans,** *Grib. Bull. Soc. Ent. Ital.* 1891, p. 246, ♀; *Dall. Torr. Cat.* ix, p. 117.

"♀. Head lightly, thorax and abdomen closely and coarsely punctured; head flat, subtriangular, as wide as the thorax; clypeus small, narrow, higher than broad, anteriorly widely arched, almost truncate; median segment subconcave posteriorly; petiole of abdomen slightly flat. Fuscous black; the anterior margin of the clypeus, the inner orbits below the sinus of the eyes, and abdominal segments 3–5 citron-yellow; the underside of the antennæ and all the legs ferruginous; wings hyaline, obsoletely lacteous, base and costal margin darkening to fuscous.

"*Hab.* India. ♀. *Length* 8 mm."

683. **Icaria scitula**, n. sp.

☿. Head, thorax, and abdomen finely shagreened, pruinose, with a silky lustre; clypeus large, slightly convex, with a minute tooth at apex; pronotum with its anterior margin sharply transverse and very narrowly recurved; median segment steeply sloped, nearly vertical, with a deep wide furrow down the middle, and the sides rounded; petiole of the abdomen not spherical at apex, base of the 2nd segment not petiolate. Intense black; a broad line on the pronotum reaching back nearly to the tegulæ, the scutellum and postscutellum bright red; the clypeus and sides of the median segment with a hoary whitish pile seen only in certain lights; the claws and the pulvilli of the tarsi testaceous; wings hyaline, the fore wing fuscous along its anterior margin, with a fuscous cloud in the radial cell.

Hab. Rangit Valley, Sikhim. ☿. *Length* 8; *exp.* 20 mm.

684. **Icaria formosa**, *Sauss. Mon. Guêp. Soc.* p. 37, ♀; *Smith, Cat.* v, p. 98.

♀. Head, thorax, and abdomen closely and finely punctured and pilose, the punctures somewhat coarse and with a tendency to appear like striæ on the large 2nd abdominal segment; median segment with a broad deep longitudinal furrow which is bordered by a sharp edge on each side; 2nd abdominal segment very long, and with a transverse depression along its posterior margin. Fuscous black, covered all over by a greyish pile, visible clearly in certain lights; wings fusco-hyaline, obscurely brownish along the costal margin of the fore wing.

Hab. India (*Smith*). ♀. *Length* 19; *exp.* 37 mm. The type and only specimen I have seen is in the British Museum.

Genus PARAICARIA.

Fig. 121.—*Paraicaria bicolor*, ☿. 3/1.

Paraicaria, *Gribodo, Bull. Soc. Ent. Ital.* 1891, p. 248.

Type, *P. bicolor*, Grib.

Range. Burma.

Of small size, in form closely allied to *Icaria*, with the same characters, except the neuration of the fore wing, which has only *two* cubital cells, the 2nd receiving both recurrent nervures.

685. **Paraicaria bicolor**, *Grib. Bull. Soc. Ent. Ital.* 1891, p. 249.

♀ or ☿. Closely resembles *Icaria scitula*, from Sikhim, in appearance, but smaller and not quite so closely punctured, the apex of the clypeus more produced, and the head broader in proportion. Black; the pronotum, scutellum, and postscutellum red; the clypeus narrowly along its anterior margin, the inner orbits to as high as the base of the antennæ, and the anterior tibiæ and

tarsi sometimes obscurely fulvous white or testaceous; wings slightly fusco-hyaline and iridescent.

Hab. Pegu Hills, Burma; Tenasserim (common). ♀ or ☿. *Length* 7–8; *exp.* 16–17 mm.

This species makes a very large *Polybia*-like nest. It is common on the sand-banks in the rivers in the hottest time of the day, sitting basking and sucking in the moisture.

Genus **POLISTES.**

Vespa, pt., *Linn. Faun. Suec.* p. 418 (1761).
Polistes, *Latr. Hist. Nat. Ins.* xiv, p. 348 (1805).
Cyclostoma, *Kirby & Spence, Introd. Ent.* 1st ed. iii, p. 633 (1826).
Gyrostoma, *Kirby & Spence, Introd. Ent.* 5th ed. iii, p. 631 (1828).

Type, *P. gallicus*, Linn.

Range. Both hemispheres.

Head flat in front, vertex not or scarcely arched; eyes reniform, rather small, not reaching the base of the mandibles; ocelli placed on the vertex in a long triangle, the posterior two rather close together; antennæ filiform, in the male arched at the apex; clypeus pentagonal, its anterior margin often roundly angular in the middle; mandibles short, nearly square, terminated by 4 teeth, the inner one often obtuse and somewhat apart from the others. Thorax elongate, the median segment oblique, flat posteriorly, and more often than not in the Eastern species transversely striate, sometimes broadly but deeply grooved down the middle; legs stout, moderately long, intermediate tibiæ with two spines at apex, claws simple. Wings long, ample; fore wing with a narrow radial cell acuminate at base and apex, three cubital cells—the 1st very long, the 2nd the smallest, receiving both recurrent nervures and strongly constricted towards the radial cell, the 3rd obliquely quadrate; the 2nd and 3rd transverse cubital nervures waved. Abdomen pseudosessile, the basal segment narrowed at base, but never transformed into a lengthened petiole as in *Icaria*, *Polybia*, &c.

Fig. 122.—*Polistes sagittarius*, ☿. 1/1.

Key to the Species.

A. Mesonotum unmarked.
  a. Abdomen plain, not banded with red or yellow.
    a'. Of large size. ♀. Length 27–30 mm. ☿. Length 21–24 mm. Head, thorax, and abdomen plain chestnut-brown .. *P. schach*, p. 394.

b'. Smaller. ♀. Length 19–20 mm. ☿. Length 17–19 mm. Head, thorax, and abdomen chestnut-brown, the greater part of the thorax variegated with black........................ *P. sulcatus*, p. 395.

b. Abdomen with the 2nd segment orange-yellow on the apical two-thirds or half.

a'. Thorax very coarsely rugose. ♀. Length 23 mm.................... *P. hoplites*, p. 395.

b'. Thorax not so coarsely rugose. ♀. Length 16–18 mm................ *P. sagittarius*, p. 395.

c. Abdomen with the apical and lateral margins of the 1st and apical margins broadly of the 3rd and 4th segments yellow .... *P. stigma*, p. 396.

d. Abdomen with the apical margins of segments 1–5 somewhat narrowly yellow.. *P. maculipennis*, p. 396.

e. Abdomen with the apical margins of segments 2–5 with broad anteriorly arched sublunate marks .... *P. assamensis*, p. 397.

f. Abdomen with the apical margins of segments 1–5 dark red .... *P. adustus*, p. 397.

B. Mesonotum with two yellow parallel lines, 2nd abdominal segment with a bisinuate black line across the middle always present .... *P. hebræus*, p. 398.

686. **Polistes schach.**

Vespa schach, *Fabr. Spec. Ins.* i, p. 461.

Polistes schach, *Fabr. Syst. Piez.* p. 270; *Sauss. Mon. Guêp. Soc.* p. 50; *Smith, Cat.* v, p. 105.

Cyclostoma orientalis, *Kirby & Spence, Introd. Ent.* iii, p. 633 (ed. i.).

Polistes orientalis, *Lep. Hym.* i, p. 519; *Smith, Cat.* v, p. 102.

Polistes gyrostoma, *Sauss. Mon. Guêp. Soc.* p. 104.

Polistes confusus, *Smith, Cat.* v. p. 102.

♀ ☿. Head and thorax closely and somewhat coarsely punctured, the punctures on the pronotum running into transverse striæ; abdomen smooth, dull and opaque; the median segment with a broad shallow furrow near the apex, transversely striate, the striæ coarse and somewhat prominent. Entirely of a dull chestnut-brown, shaded with fuscous on the thorax above and on the bases of the abdominal segments; wings brown, subhyaline, with in some specimens a purplish effulgence.

♂ similar; the eyes very small, separated from the base of the mandibles by more than two-thirds of their own length; the mandibles very large, arched, the apex with two strong teeth; the clypeus nearly square, very obtusely angled in the middle anteriorly; the head and thorax more sparsely punctured than in the ♀ or ☿; the apical joint of the flagellum of the antennæ flattened, cornute.

So far as size is concerned this species varies a good deal, but it seems pretty constant in coloration.

Hab. India (*Smith*); Sikhim (*Möller*); China (*Larking*). ♀. *Length* 27–30; *exp.* 65 mm. ♂. *Length* 30–37; *exp.* 68–88 mm. ☿. *Length* 21–24; *exp.* 62–65 mm.

687. **Polistes sulcatus.** (Pl. III, fig. 3.)
Smith, Trans. Ent. Soc. new ser. ii, 1852, p. 38; *Sauss. Mon. Guêp. Soc.* p. 59, ♀ ♂.

♀ ☿. Closely allied to and resembling *P. schach*, but constantly smaller than the smallest variety of that species; the head and thorax are more closely punctured, with the punctures shallow and giving the surface a granular look, those on the pronotum not running into striæ as in *P. schach*; in colour also *P. sulcatus* seems pretty constant, all the specimens I have seen being castaneous-brown, with the mesonotum, scutellum, postscutellum, median segment, pectus, and the whole of the sides of the thorax black; wings light, rather fulvous brown.

♂ similar; the clypeus and inner orbits yellowish.

Hab. Rangit Valley, Sikhim; China. ♀. *Length* 19–20; *exp.* 48 mm. ☿. *Length* 17–19; *exp.* 42–45 mm.

688. **Polistes hoplites,** *Sauss. Mon. Guêp. Soc.* pp. 55 & 255; *Smith, Cat.* v, p. 102.

♀. Closely resembling *P. sagittarius*, but constantly larger and the thorax much more coarsely punctured and rugose. I know no other distinction, and it is quite possible that *P. sagittarius* is but a smaller form of *P. hoplites*. This latter is a rare insect; I have only seen one or two specimens of it.

Hab. India (*Saussure, Smith*); Burma. ♀. *Length* 23–24; *exp.* 54–56 mm.

689. **Polistes sagittarius,** *Sauss. Mon. Guêp. Soc.* p. 56; *Smith, Cat.* v, p. 102.

♀ or ☿. Head, pro- and mesonotum, scutellum, postscutellum, pro-, meso-, and metapleuræ rugosely punctured, granular, in certain lights looking as if irregularly striate; median segment transversely striate, coarsely on the sides and posterior angles and fine in the middle, down which there is a broad sulcation; abdomen pruinose, with a silky appearance. Black or deep reddish brown: the black varieties have the scape and flagellum of the antennæ beneath and the apex of the clypeus, the cheeks, the pronotum anteriorly, and the scutellum reddish brown; the reddish-brown varieties have the scape of the antennæ lighter, the flagellum very dark almost black, a transverse stripe between the eyes on the vertex, the mesonotum except a reddish-brown oval patch anteriorly, the median segment, and intermediate and posterior legs black; abdomen in both varieties with the basal two (sometimes only the 2nd) segments yellow, the 1st segment more or less black at base; wings brown, ferruginous on their apical margins.

Hab. Probably throughout the greater part of India; Burma; Tenasserim; China. ♀. *Length* 18; *exp.* 44 mm. ☿. *Length* 16; *exp.* 40 mm.

690. **Polistes stigma.**

Vespa stigma, *Fabr. Ent. Syst.* ii, p. 275.
Vespa tamula, *Fabr. Ent. Syst. Suppl.* p. 263.
Polistes tamula, *Fabr. Syst. Piez.* p. 274.
Polistes stigma, *Sauss. Mon. Guêp. Soc.* p. 64, pl. vi, fig. 3; *Smith, Cat.* v, p. 102.

♀. Head, thorax, and abdomen smooth; head and thorax opaque, abdomen slightly shining; median segment with the medial groove barely marked. Dull ferruginous brown; the clypeus, mandibles, inner orbit to the sinus, the lower half of the cheeks, and a narrow line along the outer orbit above, the anterior and posterior margins of the prothorax very narrowly, the mesopleuræ except for a medial irregular reddish-brown mark, the postscutellum, two broad longitudinal and apically slightly convergent streaks on the median segment posteriorly, the anterior and intermediate coxæ in front and the posterior coxæ behind, the 1st abdominal segment except an oval reddish-brown mark in the middle above, and broad transverse bands on the posterior margins of the 3rd and 4th segments, yellow; wings light ferruginous, the fore wing with a broad subapical fuscous cloud.

Var. The wings similarly marked, but clear hyaline.

♂ similar, the vertex blackish; the 4th abdominal segment entirely yellow.

☿ similar, smaller, the bases of the 2nd and 3rd abdominal segments black.

Var. α. The two streaks on the median segment absent.

Var. β. The whole insect velvety black, the clypeus and scutellum fulvous red, the yellow markings on the head and face and on the mesopleuræ and coxæ wanting; abdomen black, with the posterior and lateral margins of the 1st and the posterior margin of the 4th segment only yellow, the posterior femora dull red; wings hyaline, with the usual subapical fuscous cloud on the fore wing.

Hab. Simla; Delhi; Allahabad; Barrackpore; Bombay; Bangalore; Madras; Ceylon; Burma; Tenasserim, extending to the Malayan region. ♀. *Length* 13–14; *exp.* 32 mm. ♂. *Length* 11; *exp.* 28 mm. ☿. *Length* 10–11; *exp.* 24 mm.

691. **Polistes maculipennis,** *Sauss. Mon. Guêp. Soc.* p. 61, pl. vi, fig. 4; *Smith, Cat.* v, p. 103.

☿. Head above, the pro- and mesonotum, and scutellum finely punctured, with a granular appearance; clypeus with only a few scattered punctures; median segment with a medial broad groove slightly transversely striate, shining; abdomen smooth and silky. Head, the mesonotum, median segment, pectus, sides of the thorax, and base of the abdomen black; the mandibles, the clypeus in the middle, the cheeks, the pronotum, scutellum, legs, and abdomen

bright reddish brown; the margins of the clypeus, the inner orbits up to the sinus of the eyes, the anterior and posterior margins of the pronotum narrowly, the tegulæ, three spots on the pleuræ, the scutellum and postscutellum anteriorly, two rather broad vertical streaks on the median segment posteriorly, and the posterior margins somewhat broadly of the 1st–5th abdominal segments yellow; wings light brownish hyaline, the subapical fuscous spot in the fore wing in all the specimens I have seen either absent or faintly marked.

Var. Some specimens are darker, with the ground-colour dark brown or fuscous black.

Hab. Sikhim; Assam; Tenasserim; Java. ☿. *Length* 11–13; *exp.* 26–31 mm. Saussure gives the Javan ☿:—*Length* 16; *exp.* 38 mm.; the Indian forms seem to me much smaller.

692. **Polistes assamensis,** n. sp.

☿. Head and abdomen finely silky, impunctate, except on the clypeus, where there are a few fine scattered punctures; pronotum, mesonotum, scutellum, and postscutellum closely, finely punctured, granular; median segment vertical, with a broad furrow down the middle, and rather coarsely transversely and regularly striate. Reddish brown; the anterior and lateral margins narrowly, the posterior margin broadly, and a line down the middle of the mesonotum, the anterior margin narrowly of the median segment, and a broad medial irregular streak on the mesopleuræ, the metapleuræ and sides of the median segment, the anterior coxæ behind, the intermediate coxæ, trochanters and bases of the femora, the posterior coxæ, trochanters, femora, tibiæ, and base of the 1st joint of the tarsi, the base of the 1st abdominal segment broadly and of the 2nd narrowly, black; the lateral posterior margins of the pronotum very narrowly, the tegulæ, the tarsi of the legs, and broad anteriorly arched sublunate marks in the middle of the posterior margins of the 2nd–5th abdominal segments, dull yellow, getting brighter towards the apex of the abdomen; the apical segment entirely yellow; wings deep ferruginous hyaline.

Var. The abdomen entirely reddish brown.

Hab. Margherita, Assam (*Doherty*); Sikhim. ☿. *Length* 12–14; *exp.* 26–28 mm.

693. **Polistes adustus,** n. sp.

☿. Head and thorax finely and closely, abdomen more sparsely punctured, the punctures on the head and abdomen shallow, and indistinct on the thorax, in front deeper, giving the surface a granular look; median segment sulcated down the middle, on the sides and posteriorly coarsely transversely striate; clypeus strongly convex, pentagonal, the apex bent downwards; scutellum and post-scutellum transversely rectangular, prominent, the latter somewhat broader in the middle. Black; the clypeus, the scape of the antennæ, an abbreviated line behind the eyes near the vertex, the pronotum, except a large triangular patch on the sides, the tubercles,

the tegulæ, the scutellum, a square spot at each lateral angle of the postscutellum, the femora above and the tibiæ of the legs, transverse broad bands on the apical margins of the 1st–5th abdominal segments above and beneath, and the whole of the 6th segment above, dark red; the 5 or 6 apical joints of the flagellum of the antennæ with a line of orange beneath; wings fulvo-hyaline, broadly fuscescent towards their apical margins.

Var. The clypeus black on its basal half, the scape black with a line of red anteriorly, the flagellum entirely black, only the margins of the pronotum and broadly of the basal two abdominal segments red, the scutellum and postscutellum entirely black; the legs black for the greater part, shaded with red on the femora beneath and the base of the tibiæ above; wings fusco-hyaline.

Hab. Sikhim, up to 6000 feet. ☿. *Length* 10–12; *exp.* 24–30 mm.

694. **Polistes hebræus.**

Vespa hebræa, *Fabr. Mant. Ins.* i, p. 292.
Polistes hebræa, *Fabr. Syst. Piez.* p. 273.
Polistes macaensis, *Fabr. Syst. Piez.* p. 272.
Vespa undata, *Oliv. Encyl. Méth.* vi, p. 684.
Polistes hebræus, *Sauss. Mon. Guêp. Soc.* p. 53; *Smith, Cat.* v, p. 101.

♀ or ☿. Head, thorax, and abdomen smooth, opaque, sometimes slightly shining; mesonotum with two short, parallel, longitudinally impressed lines on its posterior portion; medial groove on the median segment well-marked, very broad in some specimens, the transverse striations sometimes faint. From bright yellow to fulvous brown. The bright yellow forms have all the sutures on the head, thorax, and abdomen lined with black, a curved line on the vertex behind the ocelli, a transverse streak on the prothorax in front, a medial and two shorter side-streaks on the disc of the mesonotum, a transverse streak on the middle of the basal abdominal segments, and fine sinuate lines on the middle of the remaining segments black. The fulvous-brown forms have a broad band between the eyes on the vertex black, the disc of the mesonotum with one medial and two outer shorter stripes fuscous or black; the median segment black, with a spot of yellow on the sides and two parallel yellow stripes down the middle; the basal abdominal segment black, with the apical margin more or less broadly yellow; the base of the 2nd segment black, the black produced angularly back in the middle, and a transverse sinuate black line on the middle of the segment, sometimes on the 3rd to the 5th segment also; the legs have the apical four joints of the tarsi always bright yellow. Wings in both forms ferruginous or fulvo-hyaline. This species is exceedingly variable, but can be recognized by the sinuate line, which is *always present*, at any rate on the 2nd if not on the 3rd and following abdominal seg-

Fig. 123.—*Polistes hebræus*, ☿. 8/8.

ments. In a few specimens I have found the line faintly marked, and then only as a darker sinuate line on the rufescent brown base of the 2nd and following segments.

Hab. Throughout India, Burma, and Tenasserim; Persia; Arabia; Egypt; Isle of France. ♀. *Length* 20–24; *exp.* 46–48 mm. ☿. *Length* 13–16; *exp.* 36–40 mm.

Genus VESPA.

Vespa, pt., *Linn. Syst. Nat.* i, p. 948 (1767).
Crabro, pt., *Christ, Naturg. Ins.* p. 217 (1791).
Vespa, *Sauss. Mon. Guêp. Soc.* p. 110 (1853–58).

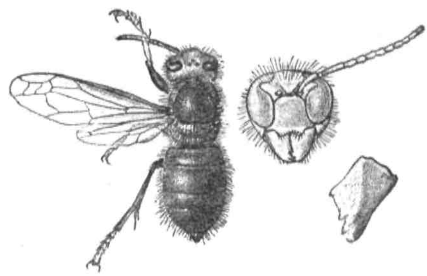

Fig. 124.—*Vespa magnifica*, ☿. ½.

Type, *V. vulgaris*, Linn.

Range. All parts of the world.

Head concave posteriorly, the cheeks often much developed; eyes variable, sometimes with a considerable distance between them and the base of the mandibles, in a few cases extending down to the latter; ocelli small as a rule, in one species very large, placed in a broad triangle on the vertex; antennæ filiform, in the male elongate, simple; clypeus not terminated by a tooth, generally square, its anterior margin transverse, slightly emarginate, in a few cases bilobed; mandibles very broad, terminated by 4 strong teeth. Thorax deep cubical, sometimes globose; median segment vertical, rounded, smooth; legs stout, rather short, the claws simple: wings long; the fore wing with the radial cell elongate, the 1st cubital cell the longest, the 2nd constricted towards the radial cell, receiving both recurrent nervures, the 3rd obliquely quadrate, the radial cell obliquely or straightly truncate at apex, not acutely rounded as in *Polistes*, *Icaria*, &c. Abdomen massive, cylindrical, suddenly and acutely pointed at the apex; the 1st segment never narrowed at base as in *Polistes*, or petiolate as in *Icaria*, but vertical anteriorly.

The species of this genus seem to be cosmopolitan. They make large nests of papery stuff, placed in trees, or in the ground, generally at the foot of a tree, or often, in India and Burma, attached to the beams under the eaves of the houses. Many species are exceedingly irritable and fierce, resenting any intrusion, even at a

good distance from their nests. Their stings are always painful and very often dangerous.

Key to the Species.

A. ♀ over 30 mm.; ☿ over 22 mm. in length.
- *a.* Abdomen entirely dark brown, with narrow transverse apical yellow bands on 1st–5th segments; 6th segment entirely yellow .. *V. magnifica*, p. 401.
- *b.* Abdomen with the basal two segments ochreous yellow .... *V. ducalis*, p. 401.

B. ♀ not over 25 mm.; ☿ not over 22 mm. in length.
- *a.* Head, thorax, and abdomen pale honey-yellow .... *V. dorylloides*, p. 400
- *b.* Head, thorax, and abdomen some shade of black, brown, reddish-brown, or sulphur-yellow, variegated with ferruginous or bright yellow.
  - *a′.* Second abdominal segment, sometimes the 1st segment also, bright or orange-yellow. *V. cincta*, p. 402.
  - *b′.* Second abdominal segment entirely light chestnut-red .... *V. orientalis*, p. 403.
  - *c′.* Second abdominal segment entirely brown or black .... *V. basalis*, p. 403.
  - *d′.* Second abdominal segment with a broad transverse apical band yellow.
    - a^2. Median segment yellow, with a **Y**-shaped black mark .... *V. bicolor*, p. 404.
    - b^2. Median segment black.
      - a^3. Head narrower than the thorax .... *V. structor*, p. 404.
      - b^3. Head as wide as the thorax .... *V. velutina*, p. 405.
    - c^2. Median segment dull yellow, the middle suffused with black .... *V. analis*, p. 405.
  - *e′.* Second abdominal segment with a narrow transverse apical band yellow.
    - a^2. Mesonotum black, unmarked.
      - a^3. ♀. Length 11–12 mm.; ☿. Length 9–10 mm. .... *V. flaviceps*, p. 406.
      - b^3. ♀ unknown; ☿. Length 18–20 mm. *V. vivax*, p. 406.
    - b^2. Mesonotum black, marked by a **U**-shaped yellow mark. ☿. Length 15–17 mm. *V. auraria*, p. 407.

695. **Vespa dorylloides.** (Pl. III, fig. 5.)

Vespa anomala, *Sauss. Mon. Guêp. Soc.* p. 112, pl. xiv, fig. 2.
Vespa dorylloides, *Sauss. Mon. Guêp. Soc.* (*Errata*), p. 256; *Smith, Cat.* v, p. 120.

♀ ☿. Head, thorax, and abdomen impunctate, silky, somewhat densely villose; head as broad as the thorax, short, the cheeks not much developed, the vertex narrowed, the eyes very nearly reaching the base of the mandibles below, the clypeus large, square, anteriorly bilobed; antennæ stout, long, filiform; ocelli large and very prominent; thorax and abdomen depressed, the latter very long and narrow. Pale honey-yellow, the antennæ, the emar-

gination of the eyes, the posterior margins of abdominal segments 1–3, and the whole of the apical three above, darker brownish yellow; the vertex black; wings hyaline, the radial cell in the fore wing brownish yellow.

Var. Some specimens are paler, others are darker than the above.

Hab. Dehra Dun; Sahâranpur; Sikhim; Burma; Tenasserim; Java; Sumatra. ♀. *Length* 14–15; *exp.* 42 mm. ☿. *Length* 11–12; *exp.* 33–36 mm.

This is a common species in Burma and Tenasserim.

696. **Vespa magnifica**, *Smith, Trans. Ent. Soc.* new ser. ii, 1852, p. 45; *id. Cat.* v, p. 119; *Sauss. Mon. Guêp. Soc.* p. 155, pl. xiii, fig. 3, ♀.

♀. Head above smooth, shining, with one or two scattere punctures; clypeus coarsely punctured; thorax and abdome smooth, with a fine silky lustre; head as wide as the thorax, rather long, compressed anteriorly, the occiput concave; scutellum and postscutellum large, prominent, the former with a medial deeply-impressed line, the latter bulging and overhanging the median segment; beneath the postscutellum is a transverse hollow produced triangularly down from the middle, and continued as a medial furrow to the apex of the median segment. Very dark brown with a golden tint in certain lights; head and scape of the antennæ orange; the sides of the pronotum, two large marks on the mesonotum anteriorly, and a spot under each wing lighter brown; abdomen pruinose, the margins of the segments 1–5 and the whole of the 6th yellow; legs covered with a glistening golden ferruginous pile, the anterior tibiæ ferruginous in front; wings dark fuscous brown.

Var. α. The whole of the thorax light brown, with a silky golden ferruginous pile; the base of the 1st abdominal segment dull yellow, with a medial vertical brown streak; wings much lighter fusco-ferruginous.

Var. β. The thorax entirely dark brown, without any of the lighter marks on the pronotum, &c.

☿. Exactly similar, but much smaller, the wings slightly lighter in tint.

Hab. The Himalayas from Simla to Darjiling; the hills of Assam, Burma, and Tenasserim. ♀. *Length* 30–35; *exp.* 66–80 mm. ☿. *Length* 23; *exp.* 60 mm.

697. **Vespa ducalis**, *Smith, Trans. Ent. Soc.*, new ser. ii, 1852, p. 39, ♀; *Sauss. Mon. Guêp. Soc.* p. 151, ♀ ☿ ♂; *Smith, Cat.* v, p. 121.

♀. Head (except the clypeus and mandibles), thorax, and abdomen smooth, clypeus and mandibles rugosely punctured; head very large, the cheeks in some specimens enormously dilated; mesonotum proportionately rather small; scutellum large and very prominent. Dull ochreous yellow; the space round the ocelli,

a line on the scape of the antennæ above, the mesonotum, the thorax beneath, the coxæ and femora beneath, a medially interrupted line on the 1st abdominal segment, and a doubly interrupted line on the 2nd, with the apical four segments entirely, dark brown or black; wings brownish hyaline, darker towards the base and along the costal margin of the fore wing; the thorax and abdomen, and especially the tibiæ and tarsi of the legs, with golden pile in certain lights.

☿ similar; the pronotum, tegulæ, tibiæ, and tarsi yellowish red; the posterior margins of the basal two segments, sometimes also the 3rd, with a transverse band of bright yellow.

♂ similar; head ferruginous; the posterior margin of the pronotum, two large marks on the mesonotum anteriorly, a spot on the tegulæ, the posterior half of the scutellum, the anterior tibiæ above, and the basal two segments of the abdomen ferruginous; a spot on each side beneath the scutellum, the posterior margin of the 2nd segment of the abdomen, and the 3rd and 4th segments entirely yellow; the 2nd segment with a line of black in front of the yellow.

Hab. Nepal; Shillong, Assam. ♀. *Length* 40; *exp.* 82 mm. ☿. *Length* 29; *exp.* 76 mm. ♂. *Length* 30; *exp.* 76 mm.

698. **Vespa cincta**, *Fabr. Syst. Ent.* p. 362; *Sauss. Mon. Guêp. Soc.* p. 152; *Smith, Cat.* v, p. 118.
Sphex tropica, *Sulz. Abgek. Gesch. Ins.* pl. xxvii, fig. 5.
Vespa unifasciata, *Oliv. Encycl. Méth.* vi, p. 677.
Crabro tenebrionis, *Christ, Naturg. Ins.* p. 216.
Vespa affinis, *Fabr. Mant. Ins.* i, p. 287; *Sauss. Mon. Guêp. Soc.* p. 154; *Smith, Cat.* v, p. 118.

♀ or ☿. Head, thorax, and abdomen punctured, with erect stiff hairs springing from the punctures; the clypeus nearly square, emarginate anteriorly, closely and strongly punctured; the punctures on the rest of the head, on the thorax and abdomen, few and scattered; median segment entirely smooth, impunctate, the medial groove short, deep at base, barely continued to the apex of the segment. Head, the pronotum, tegulæ, and scutellum brownish red; the 2nd abdominal segment bright yellow, with its base narrowly black; the rest of the thorax and abdomen black; legs black, getting reddish brown towards the tarsi, and in certain lights covered with a ferruginous golden pile; wings dark fuscous brown, paler along their apical margins.

Fig. 125.
Vespa cincta, ☿. $\frac{5}{6}$.

Var. (*a*). Basal abdominal segment reddish, with an obscure clouding of yellow on the sides; wings ferruginous.

Var. (*b*). Head, thorax, and abdomen, except the 2nd segment, entirely black; the 2nd segment deep yellow.

Var. (*c*). The 1st segment also yellow above, more or less clouded with fuscous black on the middle and sides.

Var. (*d*). The yellow on the 2nd segment shaded with fuscous black, especially on the sides.

Var. (*e*). The basal three segments more or less yellow.

Var. (*f*). The head, thorax, and abdomen reddish brown, very fine and silky, the 2nd abdominal segment pale yellow.

Hab. Throughout India, Burma, Tenasserim, Ceylon, extending into the Malayan region. ♀. *Length* 28–32; *exp.* 62–70 mm. ☿. *Length* 22–25; *exp.* 60–64 mm.

After comparison of a large series of all the forms, I am unable to find any constant structural or colour difference between *V. cincta* and *V. affinis.* The latter varies as to size, but the measurements of a large number of neuters give:—*Length* 17–23; *exp.* 54–62 mm.

699. **Vespa orientalis.** (Pl. III. fig. 4.)

Linn. Syst. Nat., Mant. p. 540; *Sauss. Mon. Guêp. Soc.* p. 132; *Smith, Cat.* v, p. 117.

Vespa turcica, *Drury, Ill. Exot. Ins.* ii, t. 39, fig. 1.

Crabro fusca, *Christ, Naturg. Ins.* p. 216.

Vespa ægyptiaca, *Vallot, Tabl. de Réaum.* p. 170.

Vespa nilotica, *Vallot, Tabl. de Réaum.* p. 170.

♀ or ☿. Head, thorax, and abdomen smooth; the clypeus with regular but sparse and very fine shallow punctures, bilobed or emarginate anteriorly; scutellum and postscutellum prominent, but not overhanging the median segment. Light chestnut-red; the clypeus dull orange-yellow (♀), brighter sulphur-yellow (☿); a line on the scape in front, the apical margin of the 1st abdominal segment narrowly above, and the 3rd and 4th segments pale sulphur-yellow, the yellow on the 1st segment emarginate anteriorly, the extreme base of the 3rd and 4th segments with a small spot on each side above reddish brown; wings flavo-hyaline.

Hab. South of Europe; Greece; Turkey; Egypt; the Punjab; North-West Provinces. ♀. *Length* 22–25; *exp.* 54–58 mm. ☿. *Length* 17–22; *exp.* 47–51 mm.

700. **Vespa basalis,** *Smith, Trans. Ent. Soc.* new ser. ii, 1852, p. 46, ♀; *Sauss. Mon. Guêp. Soc.* p. 148; *Smith, Cat.* v, p. 119.

Vespa obliterata, *Smith, Trans. Ent. Soc.* 1852, p. 47, ☿; *Sauss. Mon. Guêp. Soc.* p. 149; *Smith, Cat.* v, p. 119.

♀. Head, thorax, and abdomen smooth, with a fine silky lustre; clypeus broader than long, deeply bilobed anteriorly; mesonotum with a medial longitudinally impressed line anteriorly; scutellum and postscutellum prominent, the former with a fine medial longitudinal carina, the latter bulging, overhanging the median segment, which is concavo-truncate posteriorly. Head, thorax legs, and the basal abdominal segment a sort of dull testaceous yellow, clouded irregularly with dark brown, and covered with a golden pile, which in fresh specimens is remarkably brilliant and glistening;

the 2nd and following segments of the abdomen very dark brown or black; the basal segment with a short subapical transverse black band in the middle above, and some irregular black spots on each side near the base; wings flavo-hyaline, the costal and upper part of the medial cell in the fore wing deep yellowish brown.

☿ similar; the mesonotum and basal segment of the abdomen brown or black.

Var. The whole insect dull testaceous yellow, with a very brilliant golden pile in certain lights.

Hab. Sikhim at low elevations; Northern India; China; Burma; Tenasserim; Ceylon; Malabar. ♀. *Length* 20–23; *exp.* 50–52 mm. ☿. *Length* 17–19; *exp.* 44–46 mm.

701. **Vespa bicolor,** *Fabr. Mant. Ins.* i, p. 288; *Sauss. Mon. Guêp. Soc.* p. 143; *Smith, Cat.* v, p. 118.

♀ or ☿. Slightly pubescent, with fine, rather stiff erect hairs, smooth and impunctate, the vertex of the head and the mesonotum only sparsely and finely punctured. Light sulphur-yellow; the front from a little above the base of the antennæ, the vertex and occiput of the head, the scape above and the flagellum of the antennæ, a medial longitudinal black line on the scutellum and postscutellum not reaching the apex of the latter, a **Y**-shaped mark on the median segment posteriorly, the base and sometimes the apex also of the 2nd abdominal segment, and the apical segment generally black; basal and apical three abdominal segments, and the femora and tibiæ of the legs above, occasionally shaded with rufous brown; wings light flavo-hyaline, darker along the costal margin of the fore wing.

Hab. Sikhim; Kumaun; Sadiya, Assam (*Doherty*). ♀. *Length* 19–21; *exp.* 40–42 mm. ☿. *Length* 15–16; *exp.* 34 mm.

702. **Vespa structor,** *Smith, Trans. Zool. Soc.* vii, p. 191, pl. xxi, fig. 12, ☿.

♀. Head, thorax, and abdomen covered with rather long erect hairs, which are most dense on the vertex of the head, sides of the scutellum, sides of the median segment, and apical margins of abdominal segments 4–6; clypeus convex, rectangular, the middle anteriorly broadly produced and transverse; the head small, much narrower than the thorax; the eyes long, reaching very nearly down to the base of the mandibles; the scutellum very large, transverse, and gibbose; the postscutellum and median segment vertical, entirely hidden under the prominence of the scutellum. Head and abdomen yellow, the thorax black; the vertex and front with a blackish fuscous cloud; the anterior and posterior margins of the pronotum, the tegulæ, the lateral angles of the scutellum, the postscutellum, and the legs yellow; the bases of the 1st, 2nd, and 3rd abdominal segments black, the black produced angularly back in the middle on the segments; the femora

anteriorly with a broad streak from base black; wings brownish hyaline.

☿ similar, but with the femora at apex, tibiæ, and tarsi only yellow; abdomen reddish yellow, with the basal margins of all the segments black; the black bands narrow, produced angularly back in the middle, and irregularly notched on their posterior margins.

♂. Very similar to the ☿, but the thorax entirely intense black, only the posterior margins of the pronotum bright yellow, a black elongate spot on each side of abdominal segments 2–5 above; antennæ very long.

Hab. Binsur, Kumaun; Sikhim up to 8000 ft. ♀. *Length* 15; *exp.* 40 mm. ☿. *Length* 10–11; *exp.* 32 mm. ♂. *Length* 13; *exp.* 32 mm.

703. **Vespa velutina,** *Lepel. Hym.* i, p. 507; *Sauss. Mon. Guêp.Soc.* p. 144, ♀; *Smith, Cat.* v, p. 119.

♀ or ☿. Head, thorax, and abdomen pubescent, with soft erect hairs, longer on the head and thorax than on the abdomen, this last having a soft velvety appearance; clypeus lightly convex, slightly produced and transverse anteriorly; the sides oblique, the margin in the middle and on the sides waved; scutellum with a medial longitudinally impressed line, convex and somewhat prominent; the postscutellum and median segment vertical. Dark velvety brown or black; the clypeus, inner and outer orbits broadly interrupted above, and the front of the scape of the antennæ orange; the posterior margin of the 1st abdominal segment narrowly, the anterior tibiæ on the inside and all the tarsi bright yellow; the posterior margins of abdominal segments 2–4 broadly ferruginous yellow, broadening still more on the sides, the 5th and 6th segments ferruginous brown, the apical margin of the 5th slightly lighter brown; wings brownish hyaline.

Var. The colours in some specimens brighter, in others much duller.

Hab. Kumaun (*Miss A. Brook*); Sikhim (*Möller*); Burma; Tenasserim; China; Java. ♀. *Length* 16–18; *exp.* 40–42 mm. ☿. *Length* 14–17; *exp.* 40 mm.

704. **Vespa analis,** *Fabr. Syst. Ent.* p. 363; *Lepel. Hym.* i, p. 508; *Sauss. Mon. Guêp. Soc.* p. 152; *Smith, Cat.* v, p. 118.

♀ or ☿. Clypeus coarsely and closely punctured, square, emarginate anteriorly; head above and the thorax in front more finely and sparsely punctured; abdomen smooth, finely silky; scutellum much raised and longitudinally grooved. Head, thorax, 1st abdominal segment, and basal half of the 2nd brownish yellow; the rest of the abdomen dark brown, the same colour suffuses the apex of the mesonotum, the median segment posteriorly, and the legs; the head and thorax with erect black hairs, rather

dense on the posterior lateral margins of the median segment, the posterior margin broadly of the 2nd abdominal segment and very narrowly of segments 3–5, the whole of the 6th and a spot on each side above on segments 2–5, yellow, the spots on the 2nd segment opening anteriorly into the brownish-yellow band at the base; wings flavo-hyaline, brownish along the costal margin as far as the base of the 1st cubital cell in the fore wing.

Var. With the clypeus and face between the antennæ, the thorax, and abdomen brown or reddish brown; the vertex and cheeks, some indistinct shadings on the pro- and mesonotum, the scutellum, and base of the 1st abdominal segment yellow; abdominal segments 2–5 with a yellow spot on each side above.

Hab. India (*Smith*); Kumaun (*Miss A. Brook*). ♀. *Length* 25; *exp.* 56 mm. ☿. *Length* 20; *exp.* 50 mm.

705. **Vespa flaviceps**, *Smith, Trans. Zool. Soc.* vii, p. 191, ♀ & ☿, pl. xxi, fig. 10 ♀, 11 ☿.

♀. Head, thorax, and abdomen smooth, with erect black hairs, densest on the front and vertex of the head and apex and sides of the median segment; clypeus slightly convex, short, rounded above and on the sides, slightly produced anteriorly, the apex transverse; the scutellum only slightly raised; abdomen broad, suddenly acute at apex. Black; the head except the flagellum of the antennæ and a square spot enclosing the ocelli, the margins of the pronotum, of the scutellum and postscutellum anteriorly, a spot on each side of the apex of the median segment, a spot on each side under the wings, a transverse band on the basal three abdominal segments, and all the 4th and 5th, except an ovate black spot on each side, yellow; legs yellow, variegated with ferruginous; wings flavo-hyaline.

☿ similar, smaller; differs in having the scape of the antennæ yellow only on the front, the black more extended on the vertex of the head, and the whole of the abdominal segments with broad transverse yellow bands on their apical margins, sometimes also an interrupted yellow line at the base of the 1st abdominal segment; wings clear hyaline.

Hab. Binsur, Kumaun; Sikhim at low elevations; Tenasserim (rare). ♀. *Length* 11–12; *exp.* 28–30 mm. ☿. *Length* 8–9; *exp.* 24 mm.

706. **Vespa vivax**, *Smith, Trans. Zool. Soc.* vii, p. 190, pl. xxi, fig. 9, ☿.

☿. Head, thorax, and abdomen covered with long, erect, somewhat thickly-set black hairs, beneath this covering the head smooth but not shining; the thorax and abdomen densely pruinose. Black; the head, the apex of the femora, the tibiæ and tarsi, a broad band on the posterior margins of the 1st and 3rd abdominal segments, a very narrow one on the posterior margins of the 2nd, 4th, and 5th segments, and the whole of the 6th segment

yellow; a black ring-like mark on the front of the head, broad where it passes over the ocelli, slightly extended into the emargination of the eyes laterally, and reduced to a fine line above the base of the clypeus; the scape and basal joint of the flagellum of the antennæ beneath yellow; the broad yellow band on the margin of the 3rd abdominal segment is broadly emarginate on each side on its anterior border and has a narrow triangular incision in the middle; wings brownish hyaline.

Fig. 126.
Vespa vivax, ♀. ¼.

Hab. Binsur, Kumaun; Northern India; Sikhim, 8000 feet (rare). ☿. *Length* 18–20; *exp.* 50–52 mm.

707. **Vespa auraria**, *Smith, Trans. Ent. Soc.* 1852, p. 46, pl. viii, fig. 8, ♀; *Sauss. Mon. Guêp. Soc.* p. 147; *Smith, Cat.* v, p. 119.

♀. Head, thorax, and abdomen smooth, with a fine silky appearance and sparsely scattered erect hairs; the vertex and front of the head and mesonotum sparsely punctured. Golden brown with, in certain lights, a rich glistening pile; the head, pronotum, and scutellum reddish brown; mesonotum a darker brown with a U-shaped mark on the disc, posteriorly touching the scutellum, of brighter golden brown; the bases of the 1st and 2nd abdominal segments brown, their margins and the visible part of the remaining segments covered with a rich golden pile; wings brownish hyaline.

☿ very similar, smaller: the posterior margins of the 1st and 2nd abdominal segments narrowly yellow; the 3rd yellow, with an irregular mark at base above, nearly reaching the posterior margin in the middle, brown; the 4th entirely yellow except for a very narrow medial longitudinal brown line; the 5th yellow at base, irregularly festooned with brown along the posterior margin; the 6th entirely brown.

Hab. Northern India (*Smith*); Kumaun (*Miss A. Brook*); Tenasserim. ♀. *Length* 21; *exp.* 40 mm. ☿. *Length* 15–17; *exp.* 36–38 mm.

TRIBE ANTHOPHILA.

Family COLLETIDÆ.

Non-social bees usually of small size. Head elongate or subtriangular; *the tongue short, broad, obtuse and emarginate at apex*; thorax and abdomen ovate.

No parasitic forms are known in this family, of which only two genera are found within our limits.

Key to the Genera.

a. Fore wing with three cubital cells .... COLLETES, p. 408.
b. Fore wing with two cubital cells .... PROSOPIS, p. 409.

Genus COLLETES.

Colletes, *Latr. Hist. Nat. Ins.* iii, p. 372 (1802).
Evodia, *Panz. Krit. Revis. Faun. Deutschl.* ii, p. 207 (1806).

Type. *C. succincta*, Linn.

Range. Both hemispheres.

Head from front subtriangular, ocelli arranged in a slightly curved line nearly straight on the vertex; antennæ filiform; tongue broad, slightly emarginate at apex; the labial palpi 4-jointed, each joint slightly thickened at apex; maxillary palpi 6-jointed, nearly equal. Thorax steep or truncate posteriorly, with

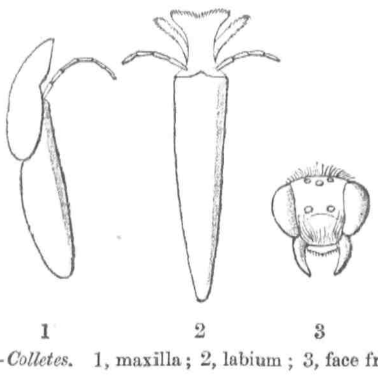

Fig. 127.—*Colletes*. 1, maxilla; 2, labium; 3, face from front.

the basal space more or less rugose: fore wings with one radial and three cubital cells; the 1st cubital nearly equal in length on the cubital nervure to the 2nd and 3rd united, the 2nd slightly narrowed towards the radial cell, receiving the 1st recurrent nervure near the middle; the 3rd cubital cell restricted above towards the radial, about half as wide above as below, receiving the 2nd recurrent nervure in its apical half; legs of moderate size, pubescent, the

tibial calcaria of the posterior legs subequal, about half the length of the basal joint of the tarsi. Abdomen broadly ovato-pyriform.

The insects belonging to this species make their burrows in hard sand or in the mortar between the stones in old walls. No species, I believe, has hitherto been recorded from India. The one described below I found tunnelling into the hard earth of a cutting on the road along the Rangit stream leading to Kalimpong in Sikhim, in April 1894.

708. **Colletes dudgeonii**, n. sp.

♀. Head above on the vertex with a few fine punctures, the thorax somewhat coarsely and closely punctured, abdomen smooth, opaque; clypeus rounded anteriorly and narrowed, convex; eyes convergent beneath; median segment truncate posteriorly, coarsely longitudinally rugose at base, with a medial furrow to the apex, the posterior face on each side of the furrow and below the rugose space at base smooth. Black; the clypeus, front, region of the ocelli, cheeks, and posterior face and sides of the median segment with long, white pubescence; the mesonotum and scutellum with scattered black erect hairs; the legs covered with a soft white down, somewhat long on the femora; the posterior margins of segments 1–5 of the abdomen with transverse bands of dense short white pubescence, the bases of the 4th and 5th segments and the pygidium covered with longish black hairs; wings hyaline, slightly fuscescent; nervures dark brown, tegulæ black.

Fig. 128.—*Colletes dudgeonii*, ♀. $\frac{3}{2}$.

Hab. Rangit Valley, 4000 ft., Sikhim. ♀. *Length* 12; *exp.* 24 mm.

Genus PROSOPIS.

Prosopis, *Fabr. Syst. Piez.* p. 293 (1804); *Smith, Cat.* i, p. 18 (1853).

Type, *P. communis*, Nyl.

Range. Both hemispheres.

Head from front elongate, flat, as wide as the thorax; ocelli in a triangle on the vertex; the tongue subemarginate at the apex; labial palpi 4-jointed; maxillary palpi 6-jointed; eyes more or less convergent beneath. Thorax oval, the median segment with a cordiform or triangular space at base, generally more or less rugose; legs slight, short: wings ample; fore wing with the radial cell broad at base, acutely pointed at apex; two cubital cells receiving the two recurrent nervures, the shape of the cubital cells and the points at which the recurrent nervures are received varying considerably.

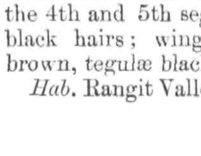
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Fig. 129.—*Prosopis.* 1, labium; 2, maxilla: much enlarged. (Smith, Cat. i, pl. vi.)

Nothing is on record of the habits of the Indian species. The European species bore holes for their nests in bramble-sticks, and in the holes construct cells lined with a thin transparent membrane calculated to retain the honey with which they fill the cells.

Key to the Species.

A. Joints of antennæ not distinct.	
a. Enclosed space at base of median segment finely rugose.	
a'. Front with a **Y**-shaped carina	*P. mixta*, p. 410.
b'. Front not carinate.	
a^2. Median segment posteriorly with a medial longitudinal carina	*P. strenua*, p. 411.
b^2. Median segment not carinate	*P. mustela*, p. 411.
b. Enclosed space at base of median segment coarsely rugose, sometimes reticulate.	
a'. Head finely punctured.	
a^2. Tarsi black	*P. feai*, p. 411.
b^2. Tarsi yellow.	
a^3. No yellow mark on clypeus	*P. fervida*, p. 412.
b^3. An oblong yellow spot on clypeus .	*P. scutula*, p. 412.
b'. Head coarsely punctured.	
a^2. A spot on each side of basal abdominal segment covered with grey pubescence......................	*P. absoluta*, p. 412.
b^2. Basal abdominal segment with no pubescent spot	*P. bellicosa*, p. 413.
B. Joints of antennæ distinct, moniliform	*P. monilicornis*, p. 413.

709. **Prosopis mixta**, *Smith, A. M. N. H.* (2) ix, 1852, p. 50, ♀ ; *id. Cat.* i, p. 30.

Prosopis leucotarsis, *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head, thorax, and abdomen smooth, a few scattered punctures on the apical margins of the 2nd and following segments ; face slightly elongate; clypeus flat, produced anteriorly, front above it carinate, the carina forking below the anterior ocellus, the lateral branches running one on each side up to the posterior ocelli; a deep hollow round the base of each antenna; median segment roundly steep at the sides and posteriorly, the enclosed space at base above slightly concave, finely rugose. Black, shining; the clypeus, the face just above it, and the tubercles yellow; the apical four joints of the tarsi and the apical margins of abdominal segments 2–5 rufo-testaceous; the tibiæ and tarsi, the apical half of the 2nd, and the whole of the following abdominal segments clothed thinly with pale glittering hairs; wings hyaline and iridescent, nervures and tegulæ very pale testaceous.

Fig. 130.—*Prosopis mixta*, ♀. $\frac{4}{1}$.

Hab. India (*Smith*). ♀. *Length* 5; *exp.* 9 mm.

710. **Prosopis strenua,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head and thorax somewhat coarsely and closely, abdomen more sparsely and shallowly punctured; head with the front and the ocellar region raised, the raised portion narrowing between the bases of the antennæ; the median segment with the middle raised, the raised portion forming a triangle, rugose, and bordered by a smooth space, rounded at the apex, beyond which is a stout keel, the apex of the median segment concavo-truncate. Black and shining; a large spot on the apex of the clypeus, a broad line on the inner orbits not reaching the vertex, a line interrupted in the middle on the pronotum, the tubercles, the anterior tibiæ in front and the tarsi, the intermediate and posterior tibiæ at base and the tarsi, yellow; antennæ fulvous beneath; wings hyaline, nervures brown.

Hab. Barrackpore, Bengal. ♀. *Length* 6; *exp.* 12 mm.

711. **Prosopis mustela,** *Vachal, Ann. Mus. Civ. Gen.* (2a) xiv, 1894, p. 446, ♀.

♀. Head lightly punctured, thorax and abdomen nearly impunctate; clypeus slightly convex, depressed and lightly emarginate at apex; median segment with a somewhat steep slope posteriorly, the sides very finely rugose, opaque, the space at base cordiform and obsoletely very slightly scabrous. Black, shining and smooth; a spot near the apex of the clypeus, a subtriangular elongate spot on each side of it, an interrupted line on the pronotum, the tubercles, a spot on the tegulæ anteriorly, the anterior tibiæ above, the posterior tibiæ, and the base of the tarsi yellow; flagellum of the antennæ testaceous towards the apex; wings hyaline.

Hab. Karen Hills, Burma; Tenasserim. ♀. *Length* 4–5; *exp.* 9 mm.

712. **Prosopis feai,** *Vachal, Ann. Mus. Civ. Gen.* (2a) xiv, 1894, p. 444, ♀ ♂.

Prosopis striatifrons, *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head and thorax closely, finely, and evenly punctured; abdomen shining, much more finely and sparsely punctured; the punctures also much more superficial; head almost subtriangular, narrowed anteriorly, with the eyes distinctly convergent below; median segment roundly steep posteriorly, the sides compressed, a Y-shaped furrow on the posterior face of the segment, the space enclosed between the base of the segment and the lateral branches of the Y somewhat coarsely reticulate and rugose. Jet-black; the clypeus, the face on each side as high as the base of the antennæ, a line on the pronotum, the tubercles, a spot on the anterior tibiæ, and an annulus on the base of the posterior tibiæ, yellow; antennæ black, the flagellum sometimes obscurely fulvescent beneath; wings hyaline, nervures piceous.

Fig. 131.—*Prosopis feai*, ♂. $\frac{3}{1}$.

♂ similar, more slender; the eyes somewhat large in proportion and more strongly convergent beneath, the antennæ longer, the flagellum dull castaneous brown beneath.

Var. With the yellow markings on the head and legs sometimes more, sometimes less developed.

Hab. Upper and Lower Burma; Tenasserim; Sikhim. ♀. *Length* 5–7; *exp.* 14–15 mm. ♂. *Length* 6·5; *exp.* 13 mm.

*713. **Prosopis fervida,** *Smith, 2nd Yark. Miss., Hym.* p. 1, ♀.

"♀. Black: the head closely and finely punctured; a yellow line on each side of the face along the margin of the eyes; the flagellum of the antennæ fulvous, slightly fuscous above. Thorax punctured above and shining; the metathorax rugose in the middle of its base; the collar, tubercles, tegulæ, the anterior tibiæ and tarsi, the intermediate and posterior tibiæ at their base and their tarsi yellow; the wings hyaline and iridescent; their nervures towards their base pale testaceous, beyond fuscous. Abdomen shining, very finely and closely punctured; the apical margins of the segments rufo-testaceous. Female, length, $2\frac{3}{4}$ lines (=about 6 mm.).

"*Hab.* Sind Valley, Kashmir."

714. **Prosopis scutula,** *Vachal, Ann. Mus. Civ. Gen.* (2ª) xiv, 1894, p. 446, ♀.

♀. Head, thorax, and abdomen finely and closely punctured, the last shining, the punctures very minute and shallow; head very little produced anteriorly, scarcely triangular, the eyes strongly convergent below; median segment truncate posteriorly, the sides somewhat rounded, the posterior face of the truncation bearing a **Y**-shaped furrow, the space between the base of the segment and the lateral branches of the furrow coarsely reticulate; abdomen broadly oval. Black; an oblong mark on the clypeus, an elongate triangular mark on each side of the latter, the pronotum, the tubercles, the knees, the base broadly of the tibiæ and the tarsi, yellow; wings hyaline, nervures pale testaceous yellow; tegulæ black, sometimes bordered anteriorly with yellow.

Hab. Shwègu, Upper Burma; Thaungyin Valley, Tenasserim. ♀. *Length* 5·5; *exp.* 10 mm.

715. **Prosopis absoluta,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head and mesonotum closely and somewhat coarsely punctured, the punctures running into indistinct striæ; the scutellum and postscutellum sparsely, the sides of the median segment closely and finely punctured; a large triangular space at base coarsely transversely rugose, the apex of the segment truncate, with a broad smooth furrow running from the apex of the enclosed space to the apex of the segment; abdomen with the basal segment smooth and shining, the 2nd and apical segments finely punctured. Black; a spot at the apex and a lunate spot at the

base of the clypeus, a line broadest in the middle along the inner orbits, another line on the pronotum, the tubercles, the tegulæ, the anterior tibiæ above and the posterior tibiæ at base, yellow; the antennæ fulvous beneath; the basal segment of the abdomen with a lateral elongated spot of greyish pubescence; wings hyaline, nervures pale testaceous.

Hab. Barrackpore, Bengal. ♀. *Length* 5; *exp.* 9 mm. Type in coll. Rothney.

716. **Prosopis bellicosa.** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♂. Head and the sides of the median segment coarsely and closely, mesonotum, scutellum, postscutellum, and abdomen more finely punctured, the last slightly pubescent, the punctures on the head running into striæ; median segment with a subtriangular space at base coarsely transversely rugose, with posteriorly and on the sides an impunctate smooth area bordered by a well-marked **V**-shaped furrow, continued from the angle of the **V** in a median line to the apex of the segment. Black; a pyramidal spot at the apex of the clypeus, a line on the inner orbits broadest in the middle and slightly emarginate above the base of the antennæ, a line interrupted in the middle on the pronotum, the tubercle, and the tegulæ yellow; the legs variegated brownish ferruginous and yellow; the antennæ beneath, the raised portion at the base of the median segment, and the truncated apex of the latter obscurely piceous brown; wings hyaline, nervures dark brown.

Hab. Barrackpore. ♂. *Length* 6; *exp.* 11 mm. Type in coll. Rothney.

*717. **Prosopis monilicornis.**

Hylæus monilicornis, *Motsch. Bull. Soc. Nat. Mosc.* xxxvi, pt. 2, 1863, p. 24.

Prosopis monilicornis, *Dall. Torr. Cat.* x, p. 27.

"Elongate, punctured, shining, black, abdomen subæneous, the palpi and tarsi rufescent, the front and sides of the thorax and the tibiæ with cinereous pile; head orbicular, depressed, densely punctured, anteriorly rugose, the front subconcave; eyes large, oval above, slightly narrowed below; antennæ about half the length of the body, incrassate, the joints subquadrate, slightly moniliform; head about as wide as the thorax; the latter subconvex, triangular, punctured, narrowed posteriorly and arched: abdomen narrower than the head, oblong, shining, sparsely pubescent, the basal segment lightly rugulose. *Length* 2 lines (=about 5 mm.)."

Hab. Ceylon.

Family APIDÆ.

This family contains both social and non-social bees, and is distinguished by having *the tongue acute at the apex, never emarginate*, generally narrow and sometimes remarkably long. In form and in the amount and character of the pubescent covering the genera vary considerably.

Key to the Genera.

A. Fore wing with three cubital cells.
- *a*. Maxillary palpi 6-jointed.
  - *a'*. Posterior tibiæ densely pubescent.
    - a^2. Ocelli in a curve on vertex.
      - a^3. Abdomen with an anal longitudinal rima (♀); clypeus and face elongate (♂) .... HALICTUS, p. 419.
      - b^3. Abdomen without any anal rima (♀); clypeus and face not elongate (♂).
        - a^4. Labrum barely exserted .... NOMIA, p. 447.
        - b^4. Labrum much exserted, prominent. TETRALONIA, p. 520.
    - b^2. Ocelli in a triangle on vertex.
      - a^3. Labrum much exserted, prominent.
        - a^4. First recurrent nervure in fore wing received at apex of 2nd cubital cell, interstitial with 2nd transverse cubital nervure .... HABROPODA, p. 521.
        - b^4. First recurrent nervure in fore wing received at middle of 2nd cubital cell......................... ANTHOPHORA, [p. 523.
      - b^3. Labrum only slightly exserted, not prominent.
        - a^4. Second cubital cell in fore wing subquadrate .... ANDRENA, p. 440.
        - b^4. Second cubital cell elongate subtriangular, the inner angle produced.................. .... XYLOCOPA, p. 533.
  - *b'*. Posterior tibiæ not densely pubescent.
    - a^2. Abdomen much narrowed at base, subpetiolate, and clavate .... NOMADA, p. 463.
    - b^2. Abdomen pseudosessile, not narrowed much towards base.
      - a^3. Ocelli in a curve on vertex; 2nd and 3rd abdominal segments more or less laterally produced .... SYSTROPHA, p. 466.
      - b^3. Ocelli in a triangle on vertex; 2nd and 3rd abdominal segments not laterally produced.
        - a^4. Colour generally black and red; 2nd cubital cell in fore wing subquadrate .... SPHECODES, p. 416.
        - b^4. Colour generally metallic blue or green, or black with yellow markings; 2nd cubital cell in fore wing in shape of a truncate triangle .. CERATINA, p. 499.
- *b*. Maxillary palpi 5-jointed .... MELECTA, p. 515.

c. Maxillary palpi 2-jointed.

a'. Pubescence on head, thorax, and abdomen very short, thick, and close............ CROCISA, p. 515.

b'. Pubescence on head, thorax, and abdomen very long and dense.

a^2. Posterior tibiæ bare, concave on outside, and fringed with long curled hairs .. BOMBUS, p. 544.

b^2. Posterior tibiæ densely pubescent and convex on outside, the fringe of hairs short not curled .... PSITHYRUS, p. 555.

d. Maxillary palpi 1-jointed .... APIS, p. 556.

B. Fore wing with two cubital cells.

a. Scutellum armed with a lateral tooth posteriorly .... CŒLIOXYS, p. 508.

b. Scutellum not so armed.

a'. Abdomen (♀) furnished with a ventral scopa or pollen-brush; (♂) dentate at apex.

a^2. Abdomen long, narrow, subcylindrical and curved.

a^3. Apex of abdomen (♀) simple; (♂) armed with two teeth .... HERIADES, p. 507.

b^3. Apex with a median longitudinal carina and a tooth on each side (♂). [p. 467.
♀ unknown .... THAUMATOSOMA,

b^2. Abdomen convex above, not cylindrical nor curved.

a^3. Maxillary palpi 2-jointed.

a^4. Second recurrent nervure received distinctly beyond apex of 2nd cubital cell .... ANTHIDIUM, p. 490.

b^4. Second recurrent nervure received at or within apex of 2nd cubital cell......................... MEGACHILE, p. 470.

b^3. Maxillary palpi 4-jointed.

a^4. Front between bases of antennæ tuberculate .... LITHURGUS, p. 469.

b^4. Front between bases of antennæ not tuberculate .... OSMIA, p. 468.

c^3. Maxillary palpi 6-jointed.

a^4. Inner tibial spur on posterior leg (♀) bent, lunate, with a row of fine minute teeth on inside; antennæ in both sexes simple .... [p. 461.
CTENOPLECTRA,

b^4. Inner tibial spur on posterior leg (♀) simple; antennæ (♂) with apical two joints dilated, flat.... [p. 460.
STEGANOMUS,

b'. Abdomen, ♀ without a ventral scopa; ♂ rounded at apex, in one genus tridentate.

a^2. Maxillary palpi 6-jointed............ ALLODAPE, p. 505.

b^2. Maxillary palpi 2-jointed.

a^3. Apex of abdomen, ♀ subangular, ♂ rounded .... STELIS, p. 496.

b^3. Apex of abdomen, ♀ incised, ♂ tridentate .... PAREVASPIS, p. 496.

C. Fore wing with one complete cubital cell or none .... MELIPONA, p. 559.

Genus SPHECODES.

Sphecodes, *Latr. Hist. Nat.* xiii, p. 368 (1805).

Type, *S. gibbus*, Linn.

Range. Both hemispheres.

Head as wide as the thorax; body nearly without pubescence; front broad, inner orbits wide apart, parallel; ocelli in a broad triangle on the vertex; tongue acute, short, not folded; labial palpi 4-jointed, the 1st joint nearly as long as the following two, apical joint minute; paraglossæ very small; maxillary palpi 6-jointed, basal joint short, about half the length of the 2nd, apical four joints shorter than the 2nd, subequal. Thorax short, broadly ovate; legs moderately stout, almost without pubescence: wings moderately broad and long, radial cell acutely pointed at apex; three cubital cells, the 1st largest, 2nd subquadrate, narrow, 3rd slightly restricted towards the radial cell, the 2nd and 3rd cubital cells receive the 1st and 2nd recurrent nervures at their apices respectively. Abdomen elongate ovate, massive, the margins of the segments often constricted.

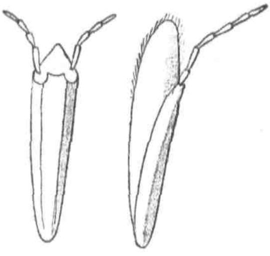

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Fig. 132.—*Sphecodes*. 1, labium; 2, maxilla: much enlarged. (Smith, Cat. i, pl. iii.)

Nothing is as yet known of the nesting-habits of the few Indian species hitherto recorded. The European species were at one time supposed to be parasitic on the *Halicti*. Mr. F. Smith, however, after careful observations, seems to have come to the conclusion that *Sphecodes* makes burrows like *Halictus*.

Key to the Species.

a. Legs entirely black.
- *a'*. Wings fuscous.
  - *a*². Apical margin of basal abdominal segment only constricted.
    - *a*³. Clypeus with a medial vertical groove. *S. apicatus*, p. 416.
    - *b*³. Clypeus without any groove .... *S. fumipennis*, p. 417.
  - *b*². Apical margin of abdominal segments 1–5 constricted .... *S. albifrons*, p. 417.
- *b'*. Wings hyaline.
  - *a*². Length 8–9 mm.......................... *S. montanus*, p. 418.
  - *b*². Length 5–6 mm.
    - *a*³. Head and thorax regularly and strongly punctured .... *S. crassicornis*, p. 418.
    - *b*³. Head and thorax smooth, with fine scattered punctures .... *S. iridipennis*, p. 418.

b. Legs red, coxæ only black .... *S. rubripes*, p. 419.

718. **Sphecodes apicatus**, *Smith, Cat.* i, p. 36, ♀; *Dall. Torr. Cat.* x, p. 1.

♀. Head and thorax closely and coarsely, abdomen very finely

and more sparsely punctured, the punctures closer along the bases of the segments, the apical margins nearly impunctate; clypeus subtriangular, very convex, the anterior margin transverse, a deep medial vertical groove anteriorly, not reaching the base of the clypeus; median segment truncate posteriorly, with the space at base concave, coarsely longitudinally striate and strongly punctured between the striæ; abdomen shining, the apical margin of the basal segment constricted. Head, thorax, legs, and apical abdominal segment black, basal five segments blood-red; sides of the face and the clypeus with silvery pubescence, thin and sparse on the latter; antennæ piceous beneath; wings light fuscous, slightly hyaline towards the base.

Fig. 133. *Sphecodes apicatus*, ♀. $\frac{3}{1}$.

Hab. India (*Smith*); Pegu Hills, Burma. ♀. *Length* 8–9; *exp.* 17–18 mm.

719. **Sphecodes fumipennis.** (Pl. III, fig. 6.)
Smith, Cat. i, p. 36, ♀; *Dall. Torr. Cat.* x, p. 4.

♀. Head and thorax densely coarsely cribrate; abdomen shining, much more finely and sparsely punctured; clypeus convex, transverse anteriorly, the margin hidden by a fringe of stiff hairs; median segment truncate posteriorly, with the deep cribrate punctures confluent and larger than on the mesonotum, the space at base very coarsely longitudinally rugose; apical margin of basal abdominal segment constricted. Head, thorax, and legs with the apical two segments of the abdomen sometimes black, rest of the abdomen, generally the entire abdomen, ferruginous red; the clypeus, the sides of the face, the cheeks, and the legs with sparse silvery white pubescence; wings fuscous, slightly paler towards the base.

♂ precisely similar; the punctures on the head and thorax deeper, closer, and coarser.

Hab. Northern India; Assam. ♀ ♂. *Length* 11–12; *exp.* 22–23 mm.

720. **Sphecodes albifrons,** *Smith, New Sp. Hym. B. M.* p. 27; *Dall. Torr. Cat.* x, p. 1.

♂. Head, mesonotum, and scutellum closely and regularly, but not coarsely punctured, shining; postscutellum and the lunate space at the base of the median segment, which is remarkable in being prominent and raised, coarsely longitudinally rugose; rest of the median segment reticulate; the face truncate posteriorly; abdomen, except the apical margins of segments 2–6, finely, regularly, and closely punctured, the apical margins of the same segments narrowly smooth and of segments 1–5 strongly constricted. Head, thorax, and legs black; abdomen shining ferruginous; the clypeus and face in front covered with dense short

white pubescence, the clypeus transverse anteriorly; the antennæ submoniliform, piceous black.

Hab. Western India. ♂. *Length* 11–12; *exp.* 20 mm. ♀ unknown.

721. **Sphecodes montanus,** *Smith, New Sp. Hym. B. M.* p. 27, ♀ ♂; *Dall. Torr. Cat.* x, p. 8.

♀. Head very finely and closely, thorax more strongly and coarsely punctured, the punctures on the latter beneath and on the sides confluent; abdomen smooth and shining, with very minute punctures at the base of the 2nd and 3rd segments; clypeus transverse anteriorly; the enclosed space at the base of the median segment subtriangular, projecting backwards and longitudinally rugose; beneath, the segment is truncate posteriorly and coarsely punctured. Head, thorax, and apical half of the 3rd and following abdominal segments black, the basal two segments and base of the 3rd rich ferruginous red; the flagellum of the antennæ at apex beneath piceous; clypeus and legs with a very thin silvery-white glittering pubescence; wings hyaline and iridescent.

♂ similar, the head and the disc of the mesonotum especially much less closely punctured; the antennæ moniliform and, with the apex of the median segment, dull castaneous; legs castaneous brown; apical half of the 5th, the whole 6th and 7th abdominal segments black, the rest of the abdomen ferruginous red.

Hab. Northern India; Mussooree. ♀ ♂. *Length* 8–9; *exp.* 16 mm.

722. **Sphecodes crassicornis,** *Smith, New Sp. Hym. B. M.* p. 28, ♂; *Dall. Torr. Cat.* x, p. 2.

Sphecodes sodalis, *Smith, t. c.* p. 28, ♂.

♂. Head and thorax regularly and strongly, abdomen very minutely and densely punctured; the head very flat, transverse, the vertex above coming almost to a sharp transverse ridge; clypeus transverse, emarginate anteriorly; median segment shining, truncate posteriorly, with a medial vertical carina, the space at base concave, coarsely longitudinally striate, and punctate between the striæ. Head, thorax, basal two-thirds of the 1st abdominal segment and the whole of the apical three black, the apical margin of the 1st and the whole of segments 2–4 ferruginous red; clypeus and face with dense white pubescence; the antennæ and legs obscurely rufo-piceous; wings hyaline and iridescent, the nervures ferruginous, the tegulæ pale rufo-testaceous.

Hab. Calcutta. ♂. *Length* 6; *exp.* 11 mm. ♀ unknown.

723. **Sphecodes iridipennis,** *Smith, New Sp. Hym. B. M.* p. 27, ♀; *Dall. Torr. Cat.* x, p. 7.

♀. Head, thorax, and abdomen smooth, brilliantly polished and shining, the head and thorax finely and not very closely punctured; the front very broad proportionately; the clypeus convex, trans-

verse anteriorly; median segment truncate posteriorly, coarsely rugose and punctured, the space at base concave and longitudinally striate. Head and thorax black; abdomen ferruginous, base and apex of the 2nd and base of the 3rd segment above fuscous, the apex broadly of the 3rd and the whole of the following segments black; the antennæ and legs piceous; wings hyaline and splendidly iridescent.

Hab. Northern India. ♀. *Length* 5; *exp.* 9 mm. ♂ unknown.

*724. **Sphecodes rubripes,** *Spin. Ann. Soc. Ent. Fr.* 1838, p. 512; *id. op. cit.* 1843, p. 438; *Dall. Torr. Cat.* x, p. 1.

"Antennæ, coxæ, head, and thorax black; abdomen, the legs (coxæ excepted), and the tegulæ of the wings red. Pubescence corresponding to the colour of the part it is growing on. Head and thorax strongly punctured, the punctures close but distinct. Disc of the metathorax more strongly punctured than the rest of the thorax, the punctures confluent, forming longitudinal striæ."

Hab. Egypt; Bombay, Western India.

Genus HALICTUS.

Halictus, *Latr. Hist. Nat. Ins.* xiii, p. 364 (1805).
Lasioglossum, *Curtis, Brit. Ent.* x, pl. 448 (1834).
Nomioides, pt., *Schenck, Berl. ent. Zeit.* x, p. 333 (1866).

Type, *H. sex-cinctus*, Fabr.

Range. Both hemispheres.

Head subtriangular, the ocelli in a curve on the vertex; the scape of the antennæ about as long as half the flagellum, the latter filiform; the clypeus more or less produced; the tongue acute; the labial palpi 4-jointed, the basal joint as long as the following two, the apical three gradually decreasing in length; the maxillary palpi 6-jointed, the basal joint the shortest, the following joints gradually decreasing in length to the apical one; the labrum (♀) transverse, with a carina in front densely fringed with pubescence. Thorax ovate; the median segment short, generally steeply sloped or truncate, and with a subtriangular lunate or cordate space at base above generally concave and punctured, striate or reticulate, sometimes pubescent; legs moderately long, the posterior legs with a floccus of long hair on the coxæ and trochanters, and a dense polliniferous scopa on the tibiæ. Wings fairly ample, the radial cell narrowing towards the apex, which is sharply acute;

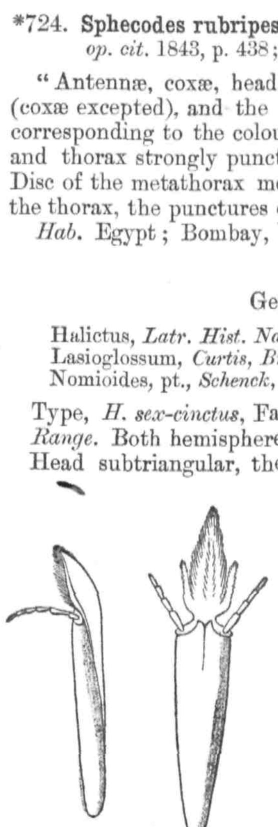

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Fig. 134.—*Halictus.* 1, maxilla; 2, labium (much enlarged).

three cubital cells, the 1st about as long as the 2nd and 3rd united, the 2nd small, subquadrate, receiving the 1st recurrent nervure near its apex, the 3rd strongly restricted above towards the radial cell, receiving the 2nd recurrent nervure in its apical third. Abdomen ovate, the apical segment with a longitudinal rima.

The male differs in having the antennæ elongate, sometimes longer than the head and thorax united, the clypeus frequently much produced; the abdomen subcylindrical and proportionately much longer than in the female.

Very little, so far as I know, is on record about the habits of the Oriental species of this genus. Mr. E. E. Green of Pundaloya, Ceylon, found *Halictus ducalis* tunnelling into a hard bank of earth in April. In the nest he found beside the *Halicti* a specimen of the parasitic bee *Nomada adusta*, Smith. Of the habits of the English species, *H. morio*, Fabr., Smith records:—"Early in April the females appeared, and continued in numbers to the end of June; not a single male was to be found at any time; during the month of July scarcely an individual could be found; a solitary female now and then might be seen, but the spring bees had almost disappeared. About the middle of August the males began to come forth, and by the end of the month abounded; the females succeeded the males in their appearance about ten or twelve days. These industrious creatures immediately began the task assigned to them, burrowing and forming their nests; one of their little tunnels had usually others running into it, so that a single common entrance served as a passage to several cells, in each of which a little ball of pollen was formed and a single egg deposited thereon. The larvæ were ten or twelve days consuming it, by which time they were fully fed; in this state they lay until they changed to the pupa state, when they very shortly became matured."

Key to the Species.

A. Enclosed space at base of median segment with oblique divergent striæ.
- *a*. Head and thorax black, sometimes with a chalybeous or castaneous tint.
  - *a'*. Abdomen impunctate-glabrous.
    - *a²*. Base of 2nd abdominal segment constricted .... *H. splendidulus*, p. 423.
    - *b²*. Base of 2nd abdominal segment not constricted.
      - *a³*. Second abdominal segment with a subapical transverse groove.. *H. albescens*, p. 423.
      - *b³*. Second abdominal segment without any transverse groove.
        - *a⁴*. Median segment with a short vertical carina posteriorly .. *H. tristis*, p. 424.
        - *b⁴*. Median segment not carinate. *H. semiœrinus*, p. 424.
  - *b'*. Basal abdominal segment glabrous, remainder punctured .... *H. catullus*, p. 424.

c'. Abdomen densely punctured.
a^2. Mesonotum glabrous .... *H. tardus*, p. 425.
b^2. Mesonotum closely punctured.... *H. dasygaster*, p. 425.
b. Head and thorax obscure blue........ *H. alphenus*, p. 426.
c. Head and thorax metallic green.
a'. Length 9–10 mm................. *H. grandiceps*, p. 426.
b'. Length 3·7–4 mm................ *H. vachalii*, p. 426.

B. Enclosed space at base of median segment with transverse striæ............ *H. discursus*, p. 427.

C. Enclosed space at base of median segment with longitudinal striæ.
a. Head and thorax black.
a'. Abdomen more or less punctured.
a^2. Bases of abdominal segments 2–6 constricted .... *H. pulchriventris*, p. 427.
b^2. Bases of abdominal segments not constricted.
a^3. Bases of segments 2–4 with pubescent bands.
a^4. Front with a vertically impressed line .... *H. proteus*, p. 428.
b^4. Front without a vertically impressed line or groove.... *H. subopacus*, p. 428.
b^3. Margins of abdominal segments 1–5 with pubescent bands .... *H. taprobanæ*, p. 428.
c^3. Abdominal segments nearly bare, apical segments with a few decumbent hairs .... *H. lucidiusculus*, p. 429.
d^3. Second and following abdominal segments covered with short fine pubescence not forming transverse bands .... *H. agrestis*, p. 429.
b'. Abdomen impunctate.
a^2. Basal two abdominal segments with a faint but distinct transverse impressed line .... *H. timidus*, p. 429.
b^2. Basal two abdominal segments without any transverse impressed lines .... *H. gutturosus*, p. 430.
b. Head and thorax metallic green ...... *H. propinquus*, p. 430.
c. Head and thorax metallic blue........ *H. vernalis*, p. 430.

D. Enclosed space at base of median segment punctured.
a. Head and thorax æneous or metallic green.
a'. Base of 2nd abdominal segment strongly depressed and constricted . *H. buccinus*, p. 431.
b'. Base of 2nd abdominal segment not constricted .... *H. vicinus*, p. 431.
b. Head and thorax black, often with a castaneous or chalybeous hue, or black and red.
a'. Abdomen smooth, impunctate.
a^2. Abdomen entirely black .... *H. spodiozonius*, p. 431.

b^2. Basal three abdominal segments red, apical three black.
  a^3. Apex of clypeus, labrum, and mandibles black .... *H. cameronii*, p. 432.
  b^3. Apex of clypeus, labrum, and mandibles yellow .... *H. xanthognathus*, p. 432.
b'. Abdomen more or less punctured.
  a^2. One or more of the abdominal segments red or rufo-fuscous.
    a^3. Basal abdominal segment impunctate, highly polished .... *H. wroughtoni*, p. 432.
    b^3. Basal abdominal segment punctured .... *H. invidus*, p. 433.
  b^2. Abdominal segments wholly black.
    a^3. Apical margins of segments with pubescent bands.
      a^4. Front below ocelli with a vertical medial carina .... *H. feai*, p. 433.
      b^4. Front not carinated.
        a^5. Length 11 mm. .... *H. fimbriatus*, p. 433.
        b^5. Length 7 mm. .... *H. garrulus*, p. 434.
    b^3. Bases of abdominal segments 2–5 with pubescent bands, apical margins bare .... *H. constrictus*, p. 434.
    c^3. Abdominal segments without pubescent bands.
      a^4. Apex of median segment roundly truncate .... *H. fimbriatellus*, p. 434.
      b^4. Apex of median segment sharply abruptly truncate .. *H. ducalis*, p. 435.

E. Enclosed space at base of median segment reticulate.
  a. Head and thorax brassy green .... *H. lucidipennis*, p. 435.
  b. Head and thorax nigro-æneous; median segment black .... *H. rugolatus*, p. 436.
  c. Black, with an obscure greenish tint in certain lights .... *H. cuniculus*, p. 436.
  d. Entirely black, with a castaneous or chalybeous tint sometimes.
    a'. Abdomen punctured.
      a^2. Median segment reticulate on the sides and apex.
        a^3. Scutellum and postscutellum reticulate .... *H. funebris*, p. 436.
        b^3. Scutellum and postscutellum not reticulate.
          a^4. Second abdominal segment constricted at base .... *H. ciris*, p. 436.
          b^4. Second abdominal segment not constricted at base .... *H. vishnu*, p. 437.
      b^2. Median segment not reticulate at sides and apex.
        a^3. Basal abdominal segment glabrous .... *H. salutator*, p. 437.
        b^3. Basal abdominal segment not glabrous .... *H. buddha*, p. 437.

b'. Abdomen impunctate.	
*a*². Clypeus with a median vertical carina.	
*a*³. Median segment truncate and margined at apex	*H. intricatus*, p. 438.
*b*³. Median segment truncate but not margined at apex............	*H. reticulatus*, p. 438.
*b*². Clypeus not carinate.	
*a*³. Basal two abdominal segments with transverse narrow furrows.	*H. senescens*, p. 438.
*b*³. Basal abdominal segment only with transverse furrow	*H. xystonotus*, p. 439.
*c*³. None of the abdominal segments transversely furrowed.	
*a*⁴. Front above base of antennæ striate	*H. amitinus*, p. 439.
*b*⁴. Front striate.	
*a*⁵. Median segment vertically carinate................	*H. rufozonatus*, p. 439.
*b*⁵. Median segment not carinate.	
*a*⁶. Mesonotum reticulate ..	*H. liodomus*, p. 440.
*b*⁶. Mesonotum not reticulate; punctured.	
*a*⁷. Legs covered with hoary pubescence ..	*H. dissimulandus*, p. 440.
*b*⁷. Legs covered with golden yellow pubescence.............	*H. serenus*, p. 440.

725. **Halictus splendidulus**, *Vachal, Ann. Mus. Civ. Gen.* (2ª) xiv, 1894, p. 432, ♀ ♂.

♀. Head in front closely punctured, opaque and slightly pubescent; thorax and abdomen smooth, brilliantly polished and shining; the mesonotum with fine regular, not very close punctures; postscutellum covered with a short pubescence; median segment narrowed posteriorly, the apex transversely truncate and margined above, the space at base with outwardly radiating fine striæ; abdomen with the base of the 2nd segment slightly constricted. Dark castaneous brown, nearly black, the legs with a glistening pale golden pubescence; the bases of segments 2–5 with traces of transverse fasciæ, broadest at the sides, of pale pubescence; wings hyaline and iridescent, nervures and tegulæ pale testaceous.

♂ similar, but with the clypeus much produced.

Hab. Karen Hills, Burma. ♀. *Length* 5; *exp.* 9 mm. ♂ slightly smaller.

726. **Halictus albescens**, *Smith, Cat.* i, p. 61, ♀ ♂.
Halictus albozonatus, *Smith, New Sp. Hym. B. M.* p. 32, ♀.

♀. Head closely and finely, thorax more sparsely punctured; median segment at the sides and apex and the abdomen smooth, shining; front flattish, not carinate, elongate; eyes distinctly convergent below; median segment with the sides compressed, the apex concavo-truncate, with a medial vertical carina; lunate space at base restricted, with outwardly divergent striæ; 1st and 2nd

abdominal segments with a distinct transverse groove across the middle. Black, the abdomen obscurely chalybeous; the face, the sides of the thorax, and median segment with thin white pubescence; the postscutellum, a broadly interrupted band at the base of the 1st abdominal segment, and entire regular transverse bands at the base of segments 2–5 covered with snow-white pubescence; the legs with pale glittering pubescence, the tarsi and anal rima fulvous; wings hyaline and iridescent, nervures ferruginous.

♂ similar, more elongate; antennæ rufo-piceous; the whole thorax and abdomen with a chalybeous tinge.

Hab. Punjab. ♀. *Length* 9–11; *exp.* 16–18 mm. ♂. *Length* 7; *exp.* 12 mm.

The types of both *H. albescens* and *H. albozonatus* are in the British Museum; the latter was described from a fresh, the former from a faded specimen. I cannot find any structural differences between the two.

727. **Halictus tristis,** *Vachal, Ann. Mus. Civ. Gen.* (2ª) xiv, 1894, p. 438, ♀.

♀. Head and thorax minutely and closely punctured; abdomen glabrous and shining; head in front very slightly elongate; eyes not convergent below; the face above the clypeus convex, with a medial vertical carina between the bases of the antennæ; median segment quadrate, posteriorly truncate and slightly compressed; a medial vertical carina down the posterior face of the truncated portion, the space at base with outwardly divergent striæ. Black; the clypeus and front with sparse, the pronotum, sides of the thorax and median segment, and base of the abdomen with thicker white pubescence, the postscutellum covered with the same; legs with long white pubescence, and transverse bands of white pubescence along the bases of abdominal segments 2–4; wings hyaline, nervures and tegulæ dark brown.

Hab. Karen Hills, Burma. ♀. *Length* 7; *exp.* 14 mm.

728. **Halictus semiærinus,** *Vachal, Ann. Mus. Civ. Gen.* (2ª) xiv, 1894, p. 443, ♀.

♀. Head densely, thorax more sparsely punctured; abdomen smooth and shining; face elongate above; the clypeus convex, with a vertical short carina; median segment truncate posteriorly, the sides and the apex above margined; the lunate space at base with outwardly divergent striæ; abdomen broadly oval. Black, the mesonotum having an æneous tint in certain lights; the legs covered with pale glittering hairs; the tarsi and the anal rima rufo-testaceous; the postscutellum with dense sordid white pubescence; wings hyaline, slightly dusky, nervures testaceous.

Hab. Karen Hills, Burma. ♀. *Length* 5; *exp.* 11 mm.

729. **Halictus catullus,** *Vachal, Ann. Mus. Civ. Gen.* (2ª) xiv, 1894, p. 437, ♀.

♀. Head and thorax densely and finely punctured; abdomen

smooth, the basal segment polished, the apical segments with close, minute, superficial punctures; head distinctly narrowed, and eyes convergent below, front not carinate; median segment truncate posteriorly, the sides rounded; the lunate space at base with coarse outwardly divergent striæ. Black, the head and thorax with an obscure chalybeous, the abdomen with a chestnut-brown tint; the clypeus and front, the cheeks and sides of the thorax, and median segment with soft greyish tomentum, the postscutellum densely covered with the same; the legs with long pale pubescence, turning yellowish on the tarsi; a spot on each side at the base of the 1st abdominal segment, and transverse bands at the bases of segments 2–5 of greyish pubescence; wings hyaline with a brownish tint, nervures and tegulæ pale testaceous.

♂ similar, more slender; the median segment compressed posteriorly and narrowed; the margins of the abdominal segments constricted; the apex of the clypeus, the tibiæ and tarsi of the anterior legs and the apex of the femora, the base and apex of the tibiæ, and the tarsi of the intermediate and posterior legs testaceous white.

Hab. Upper and Lower Burma in the plains; Tenasserim. ♀. *Length* 5–6; *exp.* 10 mm. ♂. *Length* 7; *exp.* 11 mm.

730. **Halictus tardus**, *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♂. Head and the abdomen at the base of the segments above very closely and minutely punctured; mesonotum and scutellum smooth, shining, with a few scattered small punctures; median segment abruptly truncate at apex, punctured on the sides, with the enclosed space at base obliquely striate; abdomen broad, the base and apex of segments 2–5 slightly constricted; whole head, thorax, and abdomen with a soft thin pubescence, denser on the face in front and forming transverse bands at the base of segments 2–4 of the abdomen. Shining brownish black, the pubescence greyish white; wings hyaline, nervures dark brown, tegulæ black.

Hab. Mussooree. ♂. *Length* 9; *exp.* 18 mm. Type in coll. Rothney.

731. **Halictus dasygaster.** (Pl. III, fig. 7.)
Vachal, Ann. Mus. Civ. Gen. (2ª) xiv, 1894, p. 435, ♀.

♀. Head, thorax, and abdomen shining, finely, regularly, and somewhat closely punctured, the punctures rather shallow and finer at the base of the abdominal segments; head nearly transverse, not much elongated; clypeus very slightly convex; eyes not or barely convergent below; mesonotum broad, slightly convex; median segment roundly steep posteriorly, the lunate space at base with outwardly divergent striæ; abdomen with a subapical transversely impressed line on the basal two segments. Black; the clypeus and front, a line on the pronotum broadening at the sides, the sides of the thorax and of the median segment with hoary pubescence; the postscutellum and transverse bands at the base of abdominal segments 2–4 with yellowish pubescence, the

pubescence on the legs faintly golden, on the underside of the tibiæ white; anal rima testaceous; wings hyaline, nervures piceous.

Hab. Karen Hills, Burma; Tenasserim generally. ♀. *Length* 8–9; *exp.* 18 mm.

732. **Halictus alphenus,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♂. Head and thorax sparsely punctured; abdomen impunctate, smooth and shining, except the apical two segments which are pubescent; the clypeus and scape of the antennæ, the back of the head, pronotum, sides of the thorax and median segment, the postscutellum and legs covered with a soft thin pubescence, long in some places, as on the scape of the antennæ; the enclosed space at the base of the median segment concave, obscurely obliquely striolate, the striæ very short, not reaching the posterior margins of the enclosed space. Head and thorax dark obscure blue; the antennæ and the abdomen black; the trochanters, femora, tibiæ, and tarsi of the legs castaneous; wings hyaline, nervures and tegulæ dark testaceous brown.

Hab. Mussooree. ♂. *Length* 7; *exp.* 13 mm.

733. **Halictus grandiceps,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Closely allied to *H. propinquus* (p. 430): differs in being larger and more stoutly built, with comparatively a larger head; the median segment is proportionally smaller than in *H. propinquus* and has the apex more truncate, the enclosed space at the base is narrower and much more finely punctured, the punctures running into oblique striæ. Like *H. propinquus* it is of a bronze-green colour, with white pubescent transverse fasciæ on the apical margins of segments 1–5, the apical segment with thick fulvous-white pubescence on each side of the anal rima; wings hyaline, saturated with yellowish towards the base, nervures and tegulæ testaceous.

Hab. Mussooree. ♀. *Length* 9–10; *exp.* 18 mm. Type in coll. Rothney.

734. **Halictus vachalii,** nom. nov.

Nomioides feai, *Vachal, Ann. Mus. Civ. Gen.* (2ª) xiv, p. 447, ♀ (*nec* Halictus feai, *t. c.* p. 440).

♀. Head, thorax, and abdomen having an opaque appearance from the very minute and close puncturing; head transverse; clypeus much broader than long; the antennæ inserted low down on the face; median segment rounded at the sides, truncate at apex, with a broad basal area above finely and obliquely striate and rugose. Black, the head and the mesonotum with a brilliant metallic green lustre; the mandibles, labrum, clypeus, scape of the antennæ in front, the pronotum, the tubercles, tegulæ, post-scutellum, and the apical margin of the 1st abdominal segment yellow; the legs black variegated with yellow, the anterior tibiæ and tarsi entirely yellow; the apical margins of abdominal segments 2–5 piceous above, the legs and the apical three segments with sordid white pubescence; wings hyaline and iridescent.

♂ (?) similar, smaller and slighter, the head narrower; the clypeus strongly convex, subtriangular, anteriorly transverse; the median segment longer, the space at base above slightly concave and very finely obliquely striate. Black, the head and mesonotum with an obscure metallic bluish-green lustre; the labrum, mandibles, clypeus, scape of the antennæ in front, pronotum, tubercles, the postscutellum, the apices of the femora, the tibiæ and tarsi of all the legs, and broad transverse bands on the apical margins of the basal three abdominal segments yellow; the flagellum of the antennæ deep reddish brown, the posterior tibiæ with a nigro-rufous stain near the apex above; wings hyaline and iridescent.

Hab. Thagata (*L. Fea*); Attaran Valley (*Bingham*), Tenasserim. ♀. *Length* 3·7–4; *exp.* 7 mm. ♂. *Length* 4; *exp.* 7 mm.

735. **Halictus discursus,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head, thorax, and abdomen smooth, brilliantly polished and shining; the legs thickly pubescent; the mesonotum anteriorly with a wide shallow longitudinal furrow having a carina down its middle; scutellum longitudinally furrowed; median segment with the enclosed space at base above transversely striate; the clypeus and the apical two segments of the abdomen thinly pubescent. Dark shining green, the pubescence fulvous white; the tibiæ and tarsi of the legs pale testaceous yellow; wings hyaline, nervures and tegulæ pale testaceous.

Hab. Mussooree, Northern India. ♀. *Length* 4; *exp.* 9 mm. Type in coll. Rothney.

736. **Halictus pulchriventris,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head, thorax, and abdomen very finely and closely punctured; the face in front below the anterior ocellus, the cheeks and occiput, a line on the pronotum down to the tubercles, the lateral and posterior margins of the mesonotum, the postscutellum, the median segment except on the semicircular enclosed space at base, the legs, the base of the abdomen, and transverse bands on the posterior margins of the segments, more or less densely pubescent; median segment short, posteriorly rounded, the enclosed space at base rugose; abdomen with the base of the 2nd segment strongly and of the other segments slightly constricted. Black; the pubescence yellow; the antennæ reddish brown, the 2nd joint of the flagellum beneath, the underside of the tibiæ, and the tarsi testaceous yellow; wings light flavo-hyaline, the apical margins broadly fuscous, nervures and tegulæ testaceous.

♂ similar, but with the basal segment of the abdomen narrowed at its base, almost petiolate; the wings with scarcely any tint of yellow, and the legs of a lighter colour.

Hab. Mussooree, Northern India; Karennee, Tenasserim. ♀. *Length* 10; *exp.* 21 mm. ♂. *Length* 9–10; *exp.* 21 mm. Type (♂) in coll. Rothney.

737. **Halictus proteus,** *Vachal, Ann. Mus. Civ. Gen.* (2ª) xiv, 1894, p. 438, ♀ ♂ (?).

♀. Head, thorax, and abdomen very minutely and closely punctured, the punctures on the basal abdominal segment somewhat sparser, the segment highly polished, glabrous; head transverse, the front slightly elongate, flat, an impressed vertical line from the anterior ocellus to between the bases of the antennæ; median segment truncate posteriorly, the sides convergent, margined above, the lunate space at base rugose. Black, with an obscure greenish tint in certain lights, the pubescence very pale fulvous; the clypeus and front, the pronotum and sides of the thorax sparsely pubescent, the postscutellum and transverse bands at the base of abdominal segments 2–4 covered with dense pubescence; legs with a long soft covering of pale glittering pubescence; anal rima testaceous; wings hyaline, nervures and tegulæ testaceous.

♂ (?). The face densely covered with fulvous pubescence; the apical half of each femur, the tibiæ and tarsi, and the apex of the clypeus yellow; the base of segments 2–4 of the abdomen with lateral maculæ of fulvous pubescence; the wings hyaline and vividly iridescent, nervures and tegulæ testaceous.

Hab. Tenasserim. ♀. *Length* 7; *exp.* 12 mm. ♂. *Length* 7·5; *exp.* 13 mm.

738. **Halictus subopacus,** *Smith, Cat.* i, p. 63, ♀.

♀. Head, thorax, and abdomen densely and finely punctured, granular in appearance and opaque; head in front elongate, front not carinate, eyes distinctly convergent below; clypeus very convex, its anterior margin transverse and with some coarse punctures; median segment roundly steep at the sides, truncate in the middle posteriorly, the space at base rugose. Black; the sides of the thorax, the sides and apex of the median segment, and the upper half of the legs with pale fulvous pubescence; the tibiæ and tarsi with rich golden fulvous pubescence, the base of the abdomen and the base of segments 2–4 with fulvous-white pubescence; anal rima fulvous; wings pale flavo-hyaline, nervures and tegulæ testaceous.

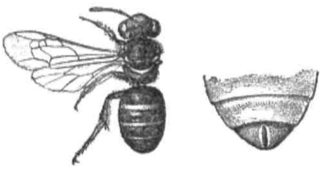


Fig. 135.
Halictus subopacus, ♀. $\frac{1}{1}$.

Hab. Sikhim; Upper Burma; China. ♀. *Length* 10–11; *exp.* 20 mm.

739. **Halictus taprobanæ,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♂. Closely allied to and resembling *H. garrulus* (p. 434): differs in having the vertex of the head flatter above; the thorax longer, not so compact, the enclosed space at the base of the median

segment not pubescent, coarsely longitudinally striate, the striæ in the middle not reaching the apex of the enclosed space; the abdomen is longer and not so broad; the wings are slightly fuscous at the apical margins, and though the tibiæ and tarsi, as in *H. garrulus*, are for the most part testaceous, the basal joint of the tarsi is conspicuously white.

Hab. Ceylon. ♂. *Length* 6; *exp.* 13 mm. Type in coll. Rothney.

740. **Halictus lucidiusculus,** *Vachal, Ann. Mus. Civ. Gen.* (2ª) xiv, 1894, p. 441, ♀ ♂.

♀. Head, thorax, and abdomen shining, extremely minutely punctured, the punctures sparse but regular; face slightly elongate; the front above the clypeus convex, medially carinate, the carina not extending much above the base of the antennæ; the median segment roundly steep and vertical at the sides and posteriorly, the base above concave and finely longitudinally rugose. Jet-black, almost without pubescence, the three or four apical abdominal segments with decumbent sparse hairs; legs with dense light brown pubescence; anal rima brownish testaceous; wings dusky hyaline, nervures piceous.

♂ very similar, elongate, the base of the abdomen obscurely piceous, the tarsi testaceous.

Hab. Karen Hills, Burma. ♀. *Length* 6; *exp.* 12 mm. ♂. *Length* 6·5; *exp.* 12·5 mm.

*741. **Halictus agrestis,** *Smith, Cat.* i, p. 61, ♀; *Dall. Torr. Cat.* x, p. 52.

♀. "Length 3 lines (= about 7 mm.). Black; head above the insertion of the antennæ closely and finely punctured; the clypeus produced, shining, having a few deep punctures on each side; the face is roughly sculptured, the antennæ beneath testaceous. The disk of the thorax strongly punctured; at the base of the metathorax (*i. e.* median segment) is a narrow arched space which is longitudinally rugose, reaching on each side nearly to the base of the hind wings, the sides of the metathorax (median segment) have a longitudinal ridge; wings hyaline, nervures ferruginous, stigma palest; abdomen very finely punctured and very highly polished at the base, the following segments covered with a short griseous pubescence more or less obliterated on the 2nd segment.

"*Hab.* Northern India (coll. J. S. Baly, Esq.)."

742. **Halictus timidus,** *Smith, New Sp. Hym. B. M.* p. 31, ♀?

♂. Head finely longitudinally striate in front, thorax sparsely punctured, abdomen impunctate; head orbicular, clypeus not much produced; front very broad, flattish, with a short indistinct carina above the base of the antennæ; eyes very slightly convergent below; median segment roundly steep, convex posteriorly, compressed at apex, not vertical; lunate space at base small, longitudinally striate; basal two abdominal segments with a faint but

quite discernible transverse impressed line. Head and thorax black; legs and abdomen rufo-testaceous, the apical five segments of the latter shading into fuscous brown towards the apex; head, pronotum, sides of the thorax, legs, apical five abdominal segments above, and all the ventral segments covered with pale glittering hairs; postscutellum densely pubescent; wings hyaline and iridescent, nervures and tegulæ rufo-testaceous.

Hab. Ceylon (*Smith*). *Length* 6; *exp.* 10 mm.

743. **Halictus gutturosus,** *Vachal, Ann. Mus. Civ. Gen.* (2ª) xiv, 1894, p. 439, ♂.

♂. Head and thorax finely but not closely punctured, shining; abdomen smooth, the basal segment highly polished; head slightly elongate in front, the eyes very slightly convergent below; median segment roundly truncate posteriorly, the lunate space at base small, rugose. Black, with an obscure chalybeous tint in certain lights; the clypeus and front, the pronotum, sides of the thorax, and the abdomen beneath covered with a thin, the postscutellum with a dense greyish-white pubescence; wings hyaline, iridescent, nervures piceous.

Hab. Bhámo, Upper Burma. ♂. *Length* 6·5; *exp.* 12 mm.

744. **Halictus propinquus,** *Smith, Cat.* i, p. 60, ♂.
Halictus alexis, *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head, thorax, and abdomen very finely and densely punctured, covered sparingly with a thin soft pubescence, more dense on the sides of the face in front and sides of the median segment and forming more or less conspicuous bands on the apical margins of the abdominal segments; median segment with the enclosed semicircular depressed space at base longitudinally rugose; abdomen with the 2nd segment constricted at base. Bright bronzy-green, the pubescence hoary, the apex of the clypeus black, the apical 7–8 joints of the flagellum of the antennæ fulvous, the tibiæ and tarsi of the legs yellow, the intermediate and posterior tibiæ with a greenish stain above; wings hyaline, iridescent, the nervures and tegulæ light testaceous yellow.

♂ similar, but smaller and slighter; segments 2–4 of the abdomen constricted, the head more densely pubescent, the apex of the clypeus yellow.

Hab. Mussooree. ♀. *Length* 7; *exp.* 12 mm. ♂. *Length* 6; *exp.* 11 mm.

745. **Halictus vernalis,** *Smith, New Sp. Hym. B. M.* p. 30, ♀.

♀. Head and thorax shining, punctured, with the punctures running into irregular striæ, abdomen smooth; head orbicular, eyes not convergent below; clypeus slightly produced, with a few large punctures at apex; front not carinated; median segment rounded posteriorly and at the sides, smooth and shining, the lunate space at base finely longitudinally striate; abdomen comparatively large, broad and massive. Bright metallic blue, the apex of the clypeus and the abdomen with purple tints; the apex of the latter,

the anal rima, the tibiæ and tarsi pubescent, testaceous; wings hyaline and iridescent, nervures and tegulæ testaceous.

♂ similar, slighter, the clypeus more produced.

Hab. Ceylon; Tenasserim. ♀. *Length* 5·5; *exp.* 10 mm. ♂ slightly smaller.

746. **Halictus buccinus**, *Vachal, Ann. Mus. Civ. Gen.* (2a) xiv, 1894, p. 443, ♂.

♂. Head and thorax very minutely granular, opaque, abdomen smooth and shining; head orbicular, slightly produced below, eyes strongly convergent beneath; front not carinate; median segment roundly steep posteriorly and at the sides, compressed, the space at base above very finely and closely punctured; abdomen elongate, the base of the 2nd segment strongly depressed. Metallic green; legs with the apex of the tibiæ and tarsi testaceous; the abdomen black, with a purple tint in certain lights; wings hyaline, nervures piceous.

Hab. Karen Hills, Burma. ♂. *Length* 4·5; *exp.* 10 mm. This, as Vachal himself suggests, may be the male of *H. fraternus*, Smith, described from Makassar.

747. **Halictus vicinus**, *Vachal, Ann. Mus. Civ. Gen.* (2a) xiv, 1894, p. 431, ♀.

♀. Head quadrate beneath, slightly narrowed; clypeus barely prominent, its anterior margin transverse and fringed with stiff hairs; head, thorax, and abdomen minutely and closely punctured, the punctures on the clypeus larger and wider apart; median segment roundly truncate posteriorly, the enclosed space at base lunate, slightly concave, densely punctured, the punctures with a tendency to form radiating striæ; abdomen massive and broad. Dull æneous green, the head and face with thin, the legs with dense fulvous pubescence; abdomen with the base of segments 2–5 having transverse bands, broad at the sides, sub-interrupted in the middle, of similar pubescence; 6th segment with the sides of the rima covered with thick fulvous pubescence; wings hyaline, nervures testaceous, tegulæ brownish.

Hab. Bhámo, Upper Burma. ♀. *Length* nearly 8; *exp.* 15 mm.

748. **Halictus spodiozonius**, *Vachal, Ann. Mus. Civ. Gen.* (2a) xiv, 1894, p. 432, ♀.

♀. Head in front thickly studded with short hairs and closely punctured; thorax shining, punctured, the punctures on the mesonotum fine and rather sparse; abdomen broad, massive and smooth; clypeus rather coarsely punctured, its anterior margin transverse and fringed with hairs; postscutellum covered with close and thick, the pleuræ with somewhat less dense pubescence; median segment roundly truncate, the space at base above narrow, slightly concave, rugosely punctate; abdomen with the apical margins of the basal four segments broadly depressed, the anterior margin of the depressed border waved, the posterior margin with a subapical rather broad band of thin short pubescence. Black, the

similar but shorter pubescence; the anterior tibiæ in front, the intermediate pair at their apex beneath, and the claw-joint of the tarsi ferruginous; wings subhyaline, the apical margins clouded, nervures ferruginous. Abdomen elongate, the apical margins of the segments have a fringe of white pubescence, more or less interrupted in the middle; the apical segment has laterally a tuft of fuscous pubescence; beneath, all the margins fringed with short white pubescence.

"*Hab.* Northern India (coll. J. S. Baly, Esq.)."

755. **Halictus garrulus,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♂. Head and thorax finely and closely, and abdomen sparsely punctured, the clypeus and front of the face densely and the thorax more sparsely pubescent; abdomen with the posterior margins of segments 1–6 with a transverse pubescent band (in the type more or less completely abraded); the head from the front almost circular; the thorax very compact, globular, the enclosed space at the base of the median segment pubescent, coarsely punctured. Black, the pubescence white with a fulvous tint, the flagellum of the antennæ beneath castaneous, the tibiæ and tarsi and the posterior margins of the abdominal segments under the pubescent bands testaceous; wings hyaline, nervures and tegulæ pale testaceous.

Hab. Mussooree. ♂. *Length* 7; *exp.* 14 mm. Type in coll. Rothney.

756. **Halictus constrictus,** *Smith, Cat.* i, p. 63, ♂.

♂. Head, thorax, and abdomen very closely and finely punctured, on the scutellum the punctures are somewhat sparse, and on the abdomen very shallow; head in front elongate; clypeus much produced, truncate anteriorly; eyes wide apart, the inner orbits nearly parallel; front not carinate; antennæ massive, as long as head and thorax united; median segment roundly truncate posteriorly, the lunate concavity as well as the sides punctured, with a granular appearance; abdomen elongate, longer than the head and thorax united. Black, the pubescence on the head and thorax white, tinged with fulvous, on the legs pale and glittering; the tibiæ and tarsi of the anterior, and the apices of the tibiæ and tarsi of the intermediate and posterior legs fulvo-ferruginous; the base of abdominal segments 2–5 with narrow transverse bands of white pubescence; wings broad and ample, hyaline and iridescent, nervures and tegulæ dark testaceous.

Hab. Northern India (*Smith*). ♂. *Length* 7–8; *exp.* 20 mm.

757. **Halictus fimbriatellus,** *Vachal, Ann. Mus. Civ. Gen.* (2ª) xiv, 1894, p. 429, ♀.

♀. Head and thorax minutely and somewhat closely, abdomen more sparsely punctured, the basal segment smooth and shining;

clypeus lightly convex, elongate, anteriorly fringed with stiffish hairs; postscutellum densely pubescent; median segment roundly truncate at apex above, slightly concave, finely rugose, punctate with a granular appearance. Dark castaneous brown, the tegulæ and posterior margins of the segments paler, the latter lightly fringed with whitish down, the pubescence on the postscutellum fulvous, on the clypeus and face sparse and white; wings hyaline, nervures and stigma testaceous.

Hab. Karen Hills, Burma; Tenasserim. ♀. *Length* 6; *exp.* 12 mm.

758. **Halictus ducalis.**

Halictus amœnus, *Bingh.* (*nec Spin.*) *P. Z. S.* 1896, p. 451, ♀.

♀. The head, thorax, and abdomen (except its basal segment) at the bases of the segments finely and closely punctured; clypeus broad, anteriorly fringed with long stiff hairs; the antennal carina well-marked; mesonotum marked with a short longitudinally-impressed line on each side close to the tegulæ; median segment compressed at the sides, truncate posteriorly, the space at base closely punctured; basal segment of abdomen entirely, and the margins of the others broadly glabrous. Black; the head, mesonotum, and basal abdominal segment piceous; the head and thorax covered with a thin fulvous pubescence; the legs testaceous brown, covered with a rich fulvous glistening pubescence; the anal rima testaceous; the wings sordid hyaline, tegulæ and nervures testaceous brown.

Fig. 137.
Halictus ducalis, ♀. $\frac{3}{2}$.

Hab. Sikhim; Ceylon; Tenasserim. ♀. *Length* 8; *exp.* 14 mm.

*759. **Halictus lucidipennis,** *Smith, Cat.* i, p. 62, ♀.

"♀. Length $2\frac{1}{4}$ lines (4·5 mm.). Brassy green, head and thorax closely and finely punctured, antennæ wanting; the face covered with short white pubescence, and the clypeus ciliated with white hairs. Thorax—the postscutellum covered with a short downy white pubescence, on the sides it is longer but of the same colour, the enclosed space at the base of the metathorax finely reticulate, the sides smooth and shining; wings clear hyaline and beautifully iridescent, nervures and tegulæ very pale testaceous; legs rufo-testaceous, the anterior tibiæ and the intermediate and posterior tarsi pale rufo-testaceous, their pubescence white. Abdomen ovate, finely punctured, the apical margins narrowly testaceous and having pale marginal fasciæ; the anal rima slightly fulvous; beneath testaceous.

"♂. Sculptured and coloured as in the female; the antennæ pale fulvous, about the length of the head and thorax, fuscous above; all the tibiæ pale and the margins of the abdominal segments much depressed.

"*Hab.* Northern India (coll. J. S. Baly, Esq.)."

*760. **Halictus rugolatus,** *Smith, Cat.* i, p. 62, ♀.

"♀. Length $3\frac{3}{4}$ lines (7·5 mm.). The head and disk of the thorax nigro-æneous, the metathorax black; head closely and finely punctured; the clypeus black, shining and irregularly deeply punctured. Thorax more strongly punctured than the head, the metathorax truncate and roughly sculptured, the sides and beneath rugose; the tibiæ and tarsi above clothed with pale fulvous pubescence, that beneath is deeper in colour; the wings subhyaline, iridescent, the nervures rufo-testaceous. Abdomen elongate-ovate, the basal segment very smooth and shining, the rest delicately punctured, the apical margins smooth, shining, and rufo-testaceous; at the basal margins of the second and third segments laterally a patch of white pubescence, on the fourth a more or less interrupted fascia; the apex covered with fulvous pubescence.

"*Hab.* Northern India (coll. W. W. Saunders, Esq.)."

761. **Halictus cuniculus,** *Vachal, Ann. Mus. Civ. Gen.* (2^a) xiv, 1894, p. 437, ♀.

♀. Head and thorax finely and closely punctured, the abdomen smooth and shining, with minute shallow punctures on the apical segments; head slightly narrowed, and eyes slightly convergent below; front with a very short medial vertical carina below the anterior ocellus; median segment truncate posteriorly, the sides obliquely convergent, the space at base coarsely reticulate and margined; abdomen short and broadly oval. Black, with an obscure greenish tint in certain lights; the clypeus and front, the cheeks, pronotum, sides of the thorax, postscutellum, and legs covered with a more or less dense hoary pubescence, the 2nd and 3rd abdominal segments with a spot on each side and an obscure fimbria on the margins of the segments of white pubescence; anal rima black; wings hyaline and iridescent, nervures and tegulæ pale testaceous.

Hab. Tenasserim. ♀. *Length* 6; *exp.* 11 mm.

762. **Halictus funebris,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♂. Head and thorax finely and closely and the abdomen more minutely punctured; median segment short, truncate at apex, rounded at the sides, the enclosed space at its base, the scutellum, and postscutellum reticulate; abdomen long, broadening towards the apex; head, thorax above and on the sides somewhat thickly pubescent. Jet-black and shining, the pubescence fuscous; wings hyaline, the nervures and tegulæ dark brownish black.

Hab. Mussooree, Northern India. ♂. *Length* 9; *exp.* 18 mm. Type in coll. Rothney.

763. **Halictus ciris,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♂. Head, thorax, and abdomen minutely and closely punctured; median segment with the enclosed space at base, the sides posteriorly, and the apex reticulate; abdomen with the base of the

2nd segment strongly constricted. Jet-black and shining; the apex of the clypeus, the labrum, palpi, apices of the femora, the tibiæ and tarsi testaceous, the tibiæ with a brownish stain anteriorly; the flagellum of the antennæ fulvous beneath; wings hyaline and iridescent, nervures and tegulæ pale testaceous.

Hab. Barrackpore, Bengal. ♂. *Length* 5; *exp.* 9 mm. Type in coll. Rothney.

764. **Halictus vishnu,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♂. Head, thorax, and abdomen minutely punctured, the last with the posterior margins of the segments smooth and impunctate; the head in front, the apex of the median segment, and the abdomen pubescent, the pubescence forming slight transverse bands at the bases of the 2nd and 3rd abdominal segments; the enclosed space at the base of the median segment and the apex with coarse widely-spaced reticulations. Black, the apex of the clypeus, the tibiæ and tarsi, and the nervures and tegulæ of the wing pale testaceous; wings hyaline and iridescent.

Hab. Mussooree. ♂. *Length* 4; *exp.* 7 mm. Type in coll. Rothney.

765. **Halictus salutator,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀ ♂. Head, thorax, and abdomen very minutely and closely punctured and covered with a thin soft short pubescence, the punctures on the front and vertex of the head running into longitudinal striæ; the pubescence on the abdomen more sparse than on the head and thorax, and confined chiefly to the apical three segments; median segment concave above, the enclosed space at base finely reticulate, the basal segment of the abdomen glabrous. Black, the pubescence whitish, fuscous on the upper part of the face and on the postscutellum; legs with the tarsi whitish, the posterior margins of segments 1–4 narrowly testaceous; wings hyaline and slightly iridescent, nervures and tegulæ dark brown.

♂ slightly smaller, with a comparatively longer head.

Hab. Mussooree. ♀. *Length* 8; *exp.* 17 mm. Type in coll. Rothney.

766. **Halictus buddha,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♂. Resembles *H. salutator*, but is smaller, the head and thorax are more closely punctured, giving the parts an opaque look, the basal segment of the abdomen is not glabrous, and the posterior margins of the segments are strongly constricted. In colour it agrees with *H. salutator* in having the base of the tibiæ and the entire tarsi white, but the anterior tibiæ are entirely white and the intermediate tibiæ white on the underside; the apex of the clypeus is testaceous yellow, the flagellum of the antennæ beneath fulvous, and the posterior margins of the abdominal segments are black, not testaceous.

Hab. Mussooree. ♂. *Length* 5; *exp.* 10 mm. Type in coll. Rothney.

767. **Halictus intricatus,** *Vachal, Ann. Mus. Civ. Gen.* (2a) xiv, 1894, p. 433, ♀.

♀. Head finely and very closely, thorax much more coarsely punctured, abdomen shining impunctate; clypeus and front pubescent; a distinct, medial, vertical, short carina on the latter; median segment rounded at the sides, abruptly truncate and margined above, the basal area coarsely reticulate above, the sides smooth; the apical margin of the basal abdominal segment constricted. Black or dark chalybeous brown, the pubescence hoary white, thin and soft on the face, dense on the postscutellum and legs; abdomen with transverse bands at the bases of the 2nd and 3rd segments of hoary white pubescence, the band on the 2nd segment very fine and narrow in the middle, broadening considerably at the sides, that on the 3rd segment evenly wide at the sides and the middle; tarsi of the legs testaceous; wings hyaline, nervures piceous.

Hab. Palon (*Fea*); Pegu Hills, Burma; Tenasserim. ♀. *Length* 6–7·5; *exp.* 12 mm.

768. **Halictus reticulatus,** *Vachal, Ann. Mus. Civ. Gen.* (2a) xiv, 1894, p. 434, ♀ ♂.

♀. Closely resembling *H. intricatus*: the head is broader below, the mesonotum more finely punctured, the upper basal portion of the median segment broader and not margined, the apex not so abruptly truncate, the pubescence is more fulvous, and the transverse bands at the base of abdominal segments 2–4 less clearly defined.

♂. The head scarcely as wide proportionately as in the ♀, the antennæ shorter, the mesonotum more finely punctured, the posterior legs stouter, with the tibiæ beneath produced slightly into an angle.

Hab. Karen Hills; Momeit, Upper Burma. ♀. *Length* 6·5; *exp.* 13 mm. ♂. *Length* 5; *exp.* 12 mm.

769. **Halictus senescens,** *Smith, New Sp. Hym. B. M.* p. 30, ♀.

♀. Head and thorax sparsely punctured; abdomen smooth and somewhat shining; head transverse, flat in front; eyes distinctly convergent beneath; clypeus slightly convex at base, front without a carina; median segment rounded at the apex, the sides vertical, the lunate flat space at base reticulate; 1st and 2nd abdominal segments with a medial, transverse, slight but distinct furrow above. Black or chalybeous brown; the clypeus, front, and back of the head, sides of the thorax, legs, base of the abdomen, and the ventral segments thinly covered with hoary pubescence; the postscutellum and transverse bands, broadest laterally, at the bases of the abdominal segments 2–4 clothed with dense white pubescence; tarsi and apical two segments, with the anal rima, testaceous; wings hyaline and iridescent, nervures and tegulæ piceous.

Hab. Bombay; Allahabad; Sikhim; Burma. ♀. *Length* 8–8·5; *exp.* 14–15 mm.

770. **Halictus xystonotus**, *Vachal, Ann. Mus. Civ. Gen.* (2ª) xiv, 1894, p. 436, ♀.

♀. Head, thorax, and abdomen glabrous, with a very few scattered punctures; head broad, front slightly concave not carinate, the punctures on it closer and finer; eyes not convergent below; mesonotum broad, convex, bearing a conspicuous medial fine longitudinally-impressed line and another short parallel line on each side; median segment truncate posteriorly, the sides rounded, the lunate space at base coarsely reticulate, the basal segment only with a transverse subapical impressed line. Black, shining, the sides of the pronotum and the postscutellum covered densely with fulvous pubescence; legs with black pubescence above and ferruginous beneath; abdomen with a fulvous-yellow pubescent spot on each side of the 2nd and 3rd abdominal segments at base; anal rima ferruginous; wings hyaline, slightly fuscescent, nervures piceous.

Hab. Palon, near Rangoon, Burma. ♀. *Length* 8; *exp.* 17 mm.

771. **Halictus amitinus**, *Vachal, Ann. Mus. Civ. Gen.* (2ª) xiv, 1894, p. 442, ♀.

♀. Head and thorax sparsely, the front above the antennæ more closely punctured, the punctures here running into oblique inwardly directed striæ; abdomen smooth, shining, and somewhat long and cylindrical; eyes not convergent below; face above the clypeus convex; median segment broadly truncate posteriorly, the sides slightly convergent, the space at base above coarsely reticulate and margined. Black, the sides of the thorax and apex of the median segment with sordid white pubescence, the clypeus fringed and the legs densely covered with ferruginous pubescence; the margins of the abdominal segments above densely testaceous, beneath fringed with ferruginous hairs; anal rima fulvo-ferruginous; wings dusky hyaline, nervures piceous.

Hab. Karen Hills, Burma. ♀. *Length* 9; *exp.* 15 mm.

772. **Halictus rufo-zonatus**, *Vachal, Ann. Mus. Civ. Gen.* (2ª) xiv, 1894, p. 442, ♀.

♀. Head above and thorax with fine scattered punctures; on the front beneath the ocelli the punctures are somewhat closer; front slightly elongate, the eyes not convergent beneath; median segment abruptly truncate posteriorly, the sides as well as the apex above margined, the face of the truncation with a short medial vertical carina, the lunate space at base coarsely reticulate; abdomen broadly oval, smooth and shining. Black, the apical margins of the basal two abdominal segments broadly rufo-testaceous; the head, thorax, and abdomen covered with a thin and short and the legs with a dense long pale pubescence; anal rima fulvous; wings hyaline, slightly fuscescent, nervures and tegulæ pale testaceous.

Hab. Bhámo, Upper Burma. ♀. *Length* 8·5–9; *exp.* 15 mm.

773. **Halictus liodomus,** *Vachal, Ann. Mus. Civ. Gen.* (2ª) xiv, 1894, p. 435, ♀.

♀. Head smooth, slightly shining, with only a few scattered punctures; mesonotum rugose, with shallow fine reticulations; abdomen smooth, the basal segment highly polished and shining; front not carinate, flattish, narrowed inferiorly, the eyes distinctly convergent below; mesonotum broad, barely convex, scutellum slightly prominent; median segment rounded at the sides, truncate posteriorly, the lunate space at base coarsely rugose. Black; the clypeus, back of the head, sides of the thorax and of the median segment with a thin hoary pubescence; legs covered with a fuscous brown, the underside of the femora and tibiæ with a brighter brown pubescence; abdomen with narrow transverse bands of white pubescence at the base of segments 2–4; wings hyaline, slightly fuscescent, nervures dark brown.

Hab. Bhámo, Upper Burma; Karen Hills. ♀. *Length* 6–7; *exp.* 13 mm.

774. **Halictus dissimulandus,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♂. Head and thorax pubescent, densely punctured; the median segment short, posteriorly rounded, the apex sharply truncate, the truncation smooth, the enclosed space at the base coarsely reticulate, the striæ diverging outwards; abdomen smooth and shining. Head and thorax black; abdomen castaneous, the 1st to the 4th segment above stained with fuscous, the 5th and apical segments above black, the basal segments beneath and the legs dark testaceous brown; the clypeus densely, the thorax and legs lightly covered with a hoary pubescence; wings hyaline and iridescent, the nervures and tegulæ pale testaceous.

Hab. Mussooree. ♂. *Length* 6; *exp.* 12 mm.

775. **Halictus serenus,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♂. Head and thorax somewhat thickly pubescent, beneath the pubescence opaque; abdomen smooth, slightly shining; median segment with the enclosed semicircular space at base large and coarsely reticulate, the rest of the segment above and on the sides slightly punctured and pubescent; abdomen subcordate, the segments above, in a strong light, appear to be very finely and closely punctured. Black; the pubescence white, golden yellow on the legs; the basal segment of the abdomen rufo-fuscous, with a fuscous transverse stripe above; wings hyaline, nervures and tegulæ pale testaceous.

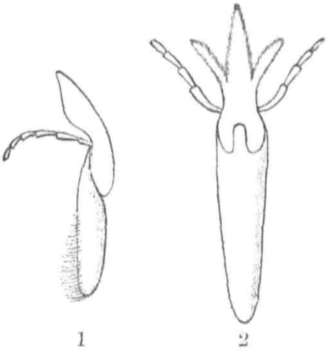
Hab. Mussooree. ♂. *Length* 5; *exp.* 12 mm.

Genus **ANDRENA.**

Andrena, pt., *Fabr. Syst. Ent.* p. 376 (1775).
Melitta, *Kirby, Mon. Apum Angl.* i, p. 130 (1802).

Type, *A. cineraria*, Fabr.
Range. Both hemispheres.

Head (♀) as wide as or (in ♂ generally) wider than the thorax; eyes oval, large; ocelli in a triangle on the vertex; antennæ filiform, basal joint of flagellum longest; labial palpi 4-jointed, basal joint longest, the following joints successively shorter; maxillary palpi 6-jointed, the 2nd longest. Thorax broadly



1 2

Fig. 138.—*Andrena.* 1, maxilla; 2, labium.

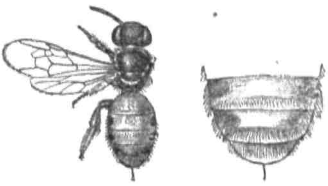


Fig. 139.—*Andrena mollis*, ♀. $\frac{3}{1}$.

ovate; fore wing with the marginal cell long and lanceolate, three cubital cells, the 2nd and 3rd each receiving a recurrent nervure; legs moderately long, the posterior trochanters with a long floccus of soft hairs; posterior tibiæ and tarsi densely pubescent on the outer side. Abdomen somewhat elongate and massive, apical margin of 5th segment and the 6th segment (♀) furnished with a dense pubescent fimbria; in the males the abdomen is markedly narrower and longer in proportion.

The nesting-habits of the few Indian species of this genus that I have had an opportunity of watching resemble those of their European allies. I have found *Nomada adusta*, Smith, frequently about the entrances to the nest-holes of *Andrena mollis* in the hills in Burma.

Key to the Species.

A. Enclosed space at base of median segment punctured.
- *a.* A medial vertical furrow from apex of enclosed space to apex of median segment.
  - *a'.* Apical half of 1st to base narrowly of 6th abdominal segment reddish .... *A. torrida*, p. 442.
  - *b'.* Basal two abdominal segments honey-yellow, remainder black .... *A. rothneyi*, p. 443.
- *b.* Median segment without a medial vertical furrow.
  - *a'.* Apical half of 1st, all 2nd and 3rd (or only basal margin of 3rd) abdominal segments reddish .... *A. communis*, p. 443.
  - *b'.* Apical margin of 1st with basal and apical margins of abdominal segments 2–4 narrowly honey-yellow .... *A. mephistophelica*, [p. 443.

B. Enclosed space at base of median segment finely obliquely striate .... *A. gracillima*, p. 444.
C. Enclosed space at base of median segment reticulate.
  a. Clypeus black, with a broad triangular brown macula .... *A. anonyma*, p. 444.
  b. Clypeus black, immaculate.
    a′. Length 8–9 mm.
      a^2. Apical margins of abdominal segments rufo-testaceous.................... *A. floridula*, p. 444.
      b^2. Apical margins of abdominal segments black............................ *A. phædra*, p. 444.
    b′. Length 12–13 mm.
      a^2. Median segment obscurely transversely striate .... *A. morosa*, p. 445.
      b^2. Median segment not transversely striate.
        a^3. Median segment with a small smooth triangular space beneath enclosed reticulate space at base .... *A. sacrissima*, p. 445.
        b^3. Median segment concavo-truncate posteriorly, without such triangular space .... *A. reticulata*, p. 445.
D. Enclosed space at base of median segment longitudinally rugose.
  a. Abdomen nearly bare or with very short pubescence .... *A. mollis*, p. 446.
  b. Abdomen with stiff, somewhat dense pubescence on apical three segments .... *A. harrietæ*, p. 446.

776. **Andrena torrida**, *Smith, New Sp. Hym. B. M.* p. 50, ♀ ♂; *Dall. Torr. Cat.* x, p. 156.

♀. Head, pronotum, and mesonotum shining, rather closely punctured; median segment and abdomen smooth, with only a few scattered punctures; clypeus broad, anteriorly margined and fimbriated with stiff hairs; a fine **Y**-shaped groove on the median segment, the space enclosed by the fork of the **Y** under a high magnifying-power appears very minutely and densely punctured; abdomen oval. Black; the apical half of the 1st to the base narrowly of the 6th abdominal segment red; the clypeus and lower half of the face, the thorax and abdomen sparsely covered with soft pale pubescence, slightly fuscous on the median segment and apex of the abdomen, and white and glittering on the legs; the apical joint of the flagellum of the antennæ and the posterior femora beneath obscurely rufo-testaceous; wings fusco-hyaline, with a purple effulgence paler at base.

♂ similar, slighter; abdomen broader posteriorly than at base, the basal two-thirds of the 1st segment, the middle above of the 4th, and the apical two segments black; the pubescence on the face fulvous, white on the abdomen, forming subapical transverse bands on the apical four segments.

Hab. Central and Western India. ♀ ♂. *Length* 12–13; *exp.* 23–25 mm.

777. **Andrena rothneyi.** (Pl. III, fig. 8.)
Cam. Mem. Manch. L. Ph. Soc. xli, 1897.

♀. Head in front and on the occiput, thorax on the sides, the legs, and apical three segments of the abdomen with longish soft pubescence; head and thorax under the pubescence closely and finely punctured; abdomen smooth, opaque; median segment with a large triangular depressed space at base finely rugulose, and bearing a short medial longitudinal furrow. Black; the basal two segments of the abdomen honey-yellow; antennæ obscurely alutaceous beneath, the pubescence on the head and thorax fuscous; the posterior femora and tibiæ each with a dense floccus of whitish golden hairs; the apical segments of the abdomen, especially on the sides, with fimbriæ of whitish pubescence; wings hyaline, nervures and tegulæ dark testaceous.

Hab. Mussooree. *Length* 10–11; *exp.* 20 mm.

778. **Andrena communis,** *Smith, New Sp. Hym. B. M.* p. 50, ♀; *Dall. Torr. Cat.* x, p. 130.
Andrena maligna, *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head closely, thorax more sparsely punctured, the punctures running into fine obscure striæ on the front of the head; abdomen very minutely and closely punctured; head transverse, flat, and slightly emarginate posteriorly; clypeus slightly convex, almost circular; median segment depressed, rounded at apex, the enclosed space at base broad, concave, densely and finely punctured; abdomen broad, depressed, and oval. Black; the apical margin narrowly of the 1st, the whole of the 2nd, and the basal margin of the 3rd segment red; the antennæ and legs obscurely piceous; the pubescence on the head and the marginal fimbriæ on abdominal segments 2–4 white; the sides of the thorax, the median segment at the sides and densely at apex, the legs, and apical two abdominal segments with longish fuscous pubescence; wings hyaline and iridescent.

Hab. Mussooree, 7000 feet. ♀. *Length* 9; *exp.* 17 mm.

779. **Andrena mephistophelica,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head and thorax densely, abdomen more thinly pubescent; median segment with thick long tufts of hair on the sides; head about the ocelli and vertex longitudinally striate; mesonotum, scutellum, and postscutellum under the pubescence sparsely, and median segment densely punctured; the enclosed triangular space at the base not well-defined in the ♀, coarsely punctured in the ♂; abdomen, where devoid of pubescence, smooth, finely, not very closely punctured. Black, the pubescence whitish yellow; the posterior margin of the basal abdominal segment and the basal and apical margins of segments 2–4 narrowly honey-yellow; the margins of the segments fringed with whitish hairs; wings hyaline, lightly fuscescent, nervures and tegulæ dark brown.

Hab. Mussooree. ♀ ♂. *Length* 9–12; *exp.* 20–22 mm.

780. **Andrena gracillima,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head in front sparsely, thorax, median segment, and abdomen densely pubescent, the head about the ocelli and vertex longitudinally striate; the thorax, median segment, and abdomen under the pubescence finely but somewhat sparingly punctured; the enclosed triangular space at the base of the median segment finely and obliquely striate. Black; the head in front with fuscous, the thorax, median segment, base of the abdomen, the coxæ, trochanters, and femora of the legs with long fulvous, and the tibiæ and tarsi, apical half of the 1st and remaining abdominal segments above with sooty-black pubescence; the apical margins of segments 2–4 above fringed with a mixture of white and fuscous hairs; wings hyaline, fuscescent towards the apex, nervures and tegulæ testaceous.

Hab. Mussooree. ♀. *Length* 15; *exp.* 28 mm.

781. **Andrena anonyma,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Resembles *A. morosa*, but the punctures on the mesonotum are more widely spaced; the clypeus is subporrect, its anterior margin rugose, the base with coarser punctures; the median segment finely rugulose, the enclosed reticulate space at the base narrower; *the abdomen smooth and shining.* Pubescence thinner, not so abundant but of the same colour and disposed as in *A. morosa.* Black, the apex of the clypeus with a broad triangular mark and the mandibles castaneous red; thorax and abdomen entirely black; wings hyaline, nervures and tegulæ pale testaceous.

Hab. Mussooree. ♀. *Length* 10–12; *exp.* 20 mm. Type in coll. Rothney.

*782. **Andrena floridula,** *Smith, 2nd Yark. Miss., Hym.* p. 2, pl. —, fig. 4.

"♂. Black; the head, thorax, and legs with long, thin, cinereous pubescence, the flagellum of the antennæ fulvous beneath; the mandibles ferruginous at their apex. Thorax—the wings hyaline and iridescent; the nervures and stigma rufo-testaceous; the legs dark rufo-piceous, the posterior tibiæ and tarsi fulvous and clothed with silvery pubescence. Abdomen oblong ovate; the apical margins of the segments testaceous and with a thin fringe of whitish pubescence; the apex fulvo-testaceous. Male, length 4 lines (=about 9 mm.).

"*Hab.* Drás, Kárgil, and Leh, all in Ladák."

783. **Andrena phædra,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♂. Head and thorax with long thick pubescence, the head and median segment closely and coarsely punctured; the pro- and mesonotum, scutellum, and postscutellum with large, somewhat widely spaced punctures under the pubescence; median segment with the enclosed space at base reticulate, beneath this a small triangular space smooth and shining; abdomen finely and closely

punctured and thinly pubescent, the pubescence forming narrow transverse bands on the posterior margins of segments 2–6 above. Black, the pubescence on the front of the head and on the thorax above cinereous with a fulvous tinge, on the head and thorax beneath and on the legs white; the bands on the margins of the abdominal segments white; wings hyaline, nervures and tegulæ testaceous.

♀ similar, but the smooth triangular space on the median segment is smaller.

Hab. Mussooree. ♂. *Length* 8; *exp.* 17 mm. ♀. *Length* 8–9; *exp.* 16 mm. Types in coll. Rothney.

784. **Andrena sacrissima,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♂. Closely resembles *A. phædra*, but is a larger and stouter insect; the pro- and mesonotum are more closely punctured; the enclosed space at the base of the median segment more coarsely reticulate, the sides and apex being smooth and shining, and the abdomen shining with very minute and dense punctures. Pubescence as in *A. phædra*, but scantier, shorter, and on the thorax more fuscous.

Hab. Mussooree. ♂. *Length* 12; *exp.* 24 mm. Type in coll. Rothney.

785. **Andrena morosa,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897

♀. Head above the bases of the antennæ longitudinally striate; clypeus large, with distant punctures; thorax finely and not very closely punctured; median segment obscurely transversely striate, the enclosed space at base very narrow, reticulate; abdomen smooth and shining; head, thorax, and abdomen covered with a thin pubescence, slightly more dense and long on the sides of the thorax, the sides and apex of the median segment, and on the legs; on the abdomen the pubescence forms transverse bands, more or less obliterated in the middle, on the posterior margins of segments 2–4. Black, the pubescence cinereous; the apical margins of the 1st and 2nd abdominal segments above bright, 3rd and 4th dark obscure testaceous brown, apical segment thickly studded with fuscous hairs; wings hyaline with a slight fuscous tinge, nervures and tegulæ testaceous.

Hab. Mussooree. ♀. *Length* 12–13; *exp.* 19 mm. Type in coll. Rothney.

786. **Andrena reticulata,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head and thorax coarsely, abdomen finely punctured; the head and thorax somewhat thinly, the median segment densely pubescent; abdomen with transverse narrow pubescent bands above, at the base of the 2nd segment and the posterior margins of segments 2–5; median segment remarkably short, concavo-truncate posteriorly, the enclosed space at base coarsely reticulate; legs stout, the posterior femora and tibiæ with a thick floccus of soft hairs. Black, the pubescence fulvous, whitish beneath the head, on the

anterior and intermediate legs and pectus; the transverse bands on the abdomen white; wings hyaline, nervures and tegulæ testaceous.

Hab. Mussooree. ♀. *Length* 12; *exp.* 22 mm. Type in coll. Rothney.

This species is a broader stouter insect with more ample wings than the majority of the species of *Andrena*.

787. **Andrena mollis,** *Smith, New Sp. Hym. B. M.* p. 50, ♀; *Dall. Torr. Cat.* x, p. 138.

♀ ♂. Somewhat resembling *A. torrida*, but the puncturing on the head and thorax very much finer and closer; median segment without the **Y**-shaped furrow, a deep broad groove at base above longitudinally rugose, the apex truncate, the sides rounded and highly polished, the apex with longish pubescence; the abdomen shorter, more broadly oval. Black, the legs and abdomen pale honey-yellow; the coxæ, trochanters, and femora at base of the anterior and intermediate legs, with the apex of the intermediate tibiæ also, and the posterior coxæ, trochanters, femora above, and base of the tibiæ fuscous black; the 1st and 2nd abdominal segments with lateral black maculæ, the 3rd segment with a transverse broad fascia in the middle above, and the 4th and following segments black; pubescence as in *A. torrida*, but fulvous golden; wings hyaline, very slightly fuscescent.

Var. With a lateral black macula on the 2nd abdominal segment only, the 3rd and 4th segments with transverse black bands in the middle, the 5th and apical segments with a greenish tint; or the 2nd and 3rd segments with lateral black maculæ, the 4th with a transverse black band at base, the following segments greenish; or the legs and abdomen entirely honey-yellow, the 2nd and 3rd segments with lateral maculæ, and the 5th with a transverse band at base black.

Hab. Bombay; Assam; Burma; Tenasserim. ♀ ♂. *Length* 8–10; *exp.* 15–19 mm.

788. **Andrena harrietæ,** n. sp.

♀. Head, thorax, and abdomen densely pubescent, the vertex of the head, the 1st abdominal segment and base of the 2nd punctured and covered with only a few scattered hairs; head subtriangular, the inner orbits parallel; eyes narrowly oval, the ocelli large, prominent, in a curve on the vertex. Head, thorax, and abdomen under the pubescence black; the clypeus, front, thorax anteriorly, and sides and apex of the median segment clothed with long fuscous grey pubescence; the posterior half of the mesonotum, the scutellum, postscutellum, the legs except the apical four joints of the tarsi, and the basal two abdominal

Fig. 140.—*Andrena harrietæ*, ♀. $\frac{3}{2}$.

segments above covered with black, the 3rd and following abdominal segments with ferruginous-red pubescence; the antennæ piceous; the apical four joints of the tarsi without pubescence, testaceous; wings hyaline and iridescent, nervures and tegulæ dark brown.

Hab. Rangit Valley, Sikhim, 1000 feet. ♀. *Length* 14; *exp.* 26 mm. Type in coll. British Museum.

Genus NOMIA.

Nomia, *Latr. Hist. Nat. Ins.* xiii, p. 369 (1805).

Type, *N. curvipes*, Fabr.

Range. Both hemispheres.

Head transverse, clypeus not produced as in *Halictus*; eyes more or less convergent beneath; ocelli arranged in a curve on the vertex; antennæ filiform, geniculated; mandibles grooved above, the apex with two teeth, the inner very much shorter than the outer; labial palpi 4-jointed, the tongue short trifid and plumed; maxillary palpi 6-jointed, the joints subclavate, the apical lobe of the maxilla very short, very much shorter than the basilar portion. Thorax subglobose; median segment very short, depressed, generally vertical, a narrow space at base usually differently sculptured from the rest of the segment, very often depressed, concave; legs stout, each posterior femur (in females) with a floccus of long hairs, and the tibiæ densely pubescent; in the male the posterior femora and tibiæ, with a few exceptions, more or less thickened, the inner apical angle of the tibiæ produced, often remarkably. Wings short and broad, the radial cell in the fore wing rounded at apex, the apex closely approximate to the costal margin; three cubital cells, the 3rd the longest, the 2nd generally square, receiving the 1st recurrent nervure past the middle, the 3rd cubital cell strongly constricted towards the marginal cell, at top about one-third as wide as at bottom, receiving the 2nd recurrent nervure past the middle. Abdomen broad, as broad as the thorax, often broader, oval, elliptical, or with the basal segment sometimes narrowed.

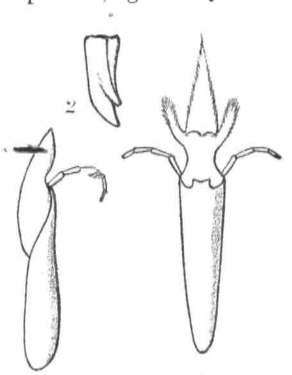


Fig. 141.—*Nomia.* 1, maxilla; 2, mandible; 3, labium. (Much enlarged.)

The species of this genus that I have observed make their nests in the hard earth of banks, sometimes on the flat ground beneath the pile-raised houses in Burma, storing pollen as food for their larvæ; the pollen, as I have often noticed, is carried on the hairy posterior femora and tibiæ.

Key to the Species.

A. Abdomen with non-pubescent transverse fasciæ.
  a. Postscutellum armed with two spines or teeth posteriorly.
    a'. Abdomen beneath and posterior legs black: length 11–13 mm. .... *N. elliotii*, p. 449.
    b'. Abdomen beneath and posterior legs rufo-testaceous: length 8 mm. .... *N. westwoodii*, p. 449.
  b. Postscutellum unarmed posteriorly.
    a'. Thorax with more or less fulvous pubescence.
      a^2. Legs rufo-fulvous or ferruginous.
        a^3. First abdominal segment without a transverse fascia .... *N. chalybeata*, p. 450.
        b^3. First abdominal segment with a transverse fascia .... *N. curvipes*, p. 450.
      b^2. Legs fuscous black, sometimes piceous.
        a^3. Mesonotum above with dense short rufo-fulvous pubescence .. *N. thoracica*, p. 451.
        b^3. Mesonotum above without or at most with very pale fulvous pubescence .... *N. formosa*, p. 451
    b'. Thorax with griseous or white pubescence.
      a^2. Enclosed space at base of median segment longitudinally rugose.
        a^3. Clypeus with a medial vertical carina .... *N. iridescens*, p. 452.
        b^3. Clypeus not carinate............ *N. albofasciata*, p. 452.
      b^2. Enclosed space at base of median segment coarsely punctured ...... *N. carinata*, p. 453.

B. Abdomen with pubescent transverse fasciæ.
  a. Fasciæ at bases of abdominal segments only .... *N. basalis*, p. 453.
  b. Fasciæ on margins of abdominal segments only.
    a'. Abdomen black with base red.
      a^2. Abdominal fasciæ pale fulvous .... *N. floralis*, p. 453.
      b^2. Abdominal fasciæ silvery white .... *N. pilipes*, p. 454.
    b'. Abdomen except fasciæ unicolorous.
      a^2. Abdominal fasciæ golden or some shade of yellow.
        a^3. Enclosed space at base of median segment longitudinally striate or rugose.
          a^4. Length 14–15 mm. .... *N. antennata*, p. 454.
          b^4. Length 8–10 mm. .... *N. aurifrons*, p. 455.
        b^3. Enclosed space at base of median segment punctured.
          a^4. Length 5 mm. .... *N. capitata*, p. 455.
          b^4. Length over 8 mm.
            a^5. Clypeus rounded anteriorly .. *N. combusta*, p. 456.
            b^5. Clypeus transverse, somewhat produced anteriorly........ *N. clypeata*, p. 456.
        c^3. Enclosed space at base of median segment coarsely reticulate .... *N. fervida*, p. 456.

b^2. Abdominal fasciæ white.
  a^3. Enclosed space at base of median segment with a single row of coarse punctures.............. *N. oxybeloides*, p. 457.
  b^3. Enclosed space at base of median segment obscurely transversely striate .... *N. rustica*, p. 457.
c^2. Abdominal fasciæ cinereous.
  a^3. Third cubital cell of fore wing less than twice length of 2nd ...... *N. vincta*, p. 458.
  b^3. Third cubital cell of fore wing more than twice as long as 2nd.
    a^4. Thorax above with dense rufo-fulvous pubescence .... *N. scutellata*, p. 458.
    b^4. Thorax above with thin cinereous pubescence .... *N. aurata*, p. 458.
C. Abdomen without transverse fasciæ.
  a. Clypeus with a medial vertical carina.... *N. terminata*, p. 459.
  b. Clypeus not carinated .... *N. fuscipennis*, p. 459.

789. **Nomia elliotii**, *Smith, Trans. Ent. Soc.* 1875, p. 44, ♀ ♂ ; *Dall. Torr. Cat.* x, p. 166.

♀. Head and thorax closely and finely punctured, more sparsely and coarsely on the scutellum; abdomen smooth, opaque, the bases of the segments only punctured; clypeus flat, carinate down the middle, transverse anteriorly; the scutellum with a more or less deep notch, or bituberculate posteriorly; the postscutellum with two teeth or spines in the middle posteriorly; the space at the base of the median segment finely punctured, the basal four abdominal segments with transverse impressed lines across the middle. Black, the head and thorax with a white somewhat griseous thin pubescence, the legs with pale glittering dense pubescence; the teeth on the postscutellum dark chestnut-brown; the basal four abdominal segments with bright emerald-green transverse fasciæ on their apical margins; wings hyaline, slightly fuscescent along their apical margins.

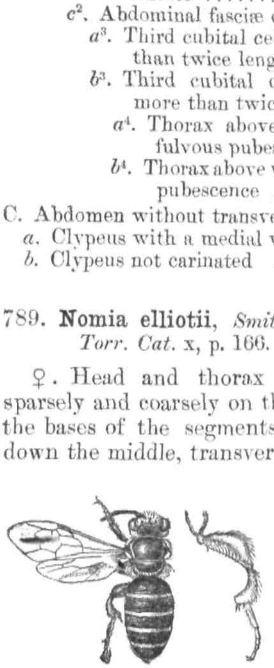


Fig. 142.—*Nomia elliotii*, ♂. $\frac{3}{1}$.

♂ similar; the tubercles at the lateral angles of the scutellum and the medial spines on the postscutellum more prominent; the posterior femora greatly swollen, the tibiæ flattened, the apex on the inner side produced into a blunt testaceous process.

Hab. The plains of India generally; Burma, Tenasserim.
♀. *Length* 11–12; *exp.* 22–23 mm. ♂ slightly smaller.

790. **Nomia westwoodii**, *Gribodo, Bull. Soc. Ent. Ital.* 1894, p. 128; *Dall. Torr. Cat.* x, p. 170.
Nomia simillima, *Smith, Trans. Ent. Soc.* 1875, p. 44, ♂, pl. ii, fig. 4 (*nec Smith, Jour. Linn. Soc.* 1863, p. 46).

♂. This is closely allied to *N. elliotii*, and like that species has the posterior lateral angles of the scutellum tuberculate and the postscutellum armed with two teeth; but it is constantly smaller, the posterior femora and tibiæ are proportionately not so swollen and thick, and the inner angle of the apex of the latter is produced and rounded, not forming a flat sharply truncate process as in *N. elliotii*. In colour, too, *N. westwoodii* differs in having the abdomen beneath and the posterior legs pale rufo-testaceous.

Hab. Bengal. ♂. *Length* 8; *exp.* 15 mm.

791. **Nomia chalybeata**, *Smith, Trans. Ent. Soc.* 1875, p. 59, ♀ ♂, pl. ii, fig. 5, ♂; *Dall. Torr. Cat.* x, p. 165.

♀. Head above, thorax, and abdomen very finely and closely punctured; clypeus more coarsely rugose, convex, transverse anteriorly, with a medial vertical carina; median segment very short, vertical, and rounded posteriorly, a hollow space along the base, above coarsely longitudinally rugose. Black; the legs and the apical ten joints of the flagellum of the antennæ beneath rufo-fulvous; the pubescence on the face and cheeks griseous with a yellowish tint, on the thorax and legs rich rufo-fulvous, on the abdomen above very sparse, erect, and black, on the abdomen beneath more or less fulvous; abdominal segments 2–4 with broad blue-green fasciæ on their apical margins.

♂ similar; abdominal segments 2–5 with blue-green fasciæ, the posterior femora incrassate, the tibiæ curved and produced at their apices into blunt, apically-truncated, thin processes of a pale testaceous colour. Wings in both sexes flavo-hyaline, very slightly fuscous along their apical margins.

Hab. China; Tenasserim. ♀ ♂. *Length* 12–15; *exp.* 24–28 mm.

792. **Nomia curvipes**, *Fabr. Ent. Syst.* ii, p. 310, ♂; *Smith, Trans. Ent. Soc.* 1875, p. 42, ♀ ♂, pl. i, fig. 8; *Dall. Torr. Cat.* x, p. 165.

♀. Head and abdomen lightly but closely, thorax densely and more coarsely punctured; clypeus slightly convex, transverse anteriorly; median segment somewhat coarsely punctured, rounded at the sides, the apex concavo-truncate; the narrow space along the base coarsely longitudinally striate. Black, the antennæ and legs testaceous brown, the scape of the former pale, the front and legs covered with pale glittering pubescence, the thorax and median segment with dense fulvo-ferruginous pubescence; the apical margins of abdominal segments 1–4 bright greenish yellow, smooth and shining; wings fulvo-hyaline, fuscous along their apical margins, nervures and tegulæ rufo-piceous.

♂ similar; the posterior femora immensely swollen, the tibiæ broadened towards the inner side, produced into an acute angle; abdomen with the apical margin of the 5th segment also broadly

yellow; apical halves of the femora, the tibiæ, and tarsi yellow, the coxæ, trochanters, and base of the femora black.

Hab. The Punjab; Bengal; Upper Burma. ♀ ♂. *Length* 11–12; *exp.* 22 mm.*

793. **Nomia thoracica**, *Smith, Trans. Ent. Soc.* 1875, p. 45, ♀ ♂, pl. i, fig. 10; *Dall. Torr. Cat.* x, p. 170.

♀. Head, thorax, and legs densely pubescent; median segment posteriorly bare, and as well as the abdomen very closely and finely punctured; clypeus convex, nearly transverse anteriorly; median segment vertical, the groove along base above longitudinally rugose. Black, the legs underneath the pubescence fuscous, abdomen with the apical margins of the basal four segments narrowly white; the pubescence on the head somewhat thin and cinereous, on the mesonotum and scutellum dense, short, and rich rufo-fulvous, on the postscutellum, sides of the thorax, and legs pale

Fig. 143.—*Nomia thoracica*, ♀. $\frac{3}{2}$.

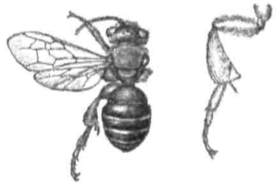


Fig. 144.—*Nomia thoracica*, ♂. $\frac{3}{2}$.

and glittering, on the abdomen much sparser and black; wings hyaline with a slight yellow tint, nervures and tegulæ testaceous brown.

♂ similar; the legs black, only thinly pubescent, each of the posterior coxæ with a small tubercle, the posterior femora and tibiæ greatly swollen, the apices of the latter whitish and triangularly produced beneath; abdomen as in the ♀, but with no white fascia on the apical margin of the 1st segment.

Hab. Barrackpore; Burma; Tenasserim; China. ♀ ♂. *Length* 11–13; *exp.* 22–25 mm.

794. **Nomia formosa**, *Smith, Jour. Linn. Soc.* 1859, p. 5, ♀ ♂; *Dall. Torr. Cat.* x, p. 167.

♀. Head and thorax minutely and densely, abdomen more lightly and sparsely punctured; clypeus slightly convex and raised, transverse anteriorly, with a medial longitudinal carina; median segment opaque, truncate posteriorly, with an obscure slight medial carina, space at base very slight and narrow, closely and finely punctured; abdomen broadly oval. Black, the antennæ and legs piceous, the head and face with thin white pubescence; a line on the pronotum, the tubercles, the sides of the thorax, and the post-

* *Nomia strigata*, Fabr., given by that author as from India, is a Javan species, and *N. indica*, Lepel., is probably identical with it.

scutellum densely pubescent, the sides and apex of the median segment and the legs covered with fulvous pubescence; the abdomen obscurely chalybeous, the apical margins of segments 1–4 above narrowly greenish blue; wings subhyaline with a fulvous tint.

♂ similar; the legs black, covered with pale glittering pubescence, the posterior femora swollen, the posterior tibiæ dilated, subtriangular; the 5th abdominal segment with a greenish-blue transverse fascia.

Hab. Burma; Tenasserim; Sumatra (*Dr. Martin*); Celebes. ♀. *Length* 11–12; *exp.* 20–22 mm. ♂. *Length* 11; *exp.* 22 mm.

795. **Nomia iridescens.** (Pl. III, fig. 9.)

Smith, Jour. Linn. Soc. ii, 1858, p. 43, ♀; *Dall. Torr. Cat.* x, p. 167.

♀. Head, thorax, and abdomen very minutely and densely punctured; clypeus convex, with coarser punctures, and a medial sharp vertical carina, its anterior margin transverse; mesonotum broad, slightly convex, and in certain lights showing several fine abbreviated longitudinally-impressed parallel lines on the disc; enclosed space at base of median segment longitudinally rugose. Black, the head and thorax opaque; the abdomen shining, iridescent in certain lights, segments 2–4 with transverse bright green or blue fasciæ on their apical margins, the pubescence on the head and thorax and legs griseous with a fulvous tint, most dense on the sides of the face, the cheeks, and the sides of the median segment; wings hyaline and iridescent, nervures and tegulæ testaceous.

♂ similar; the pubescence on the face more dense, the legs longer with more sparse pubescence, the posterior femora and tibiæ only slightly swollen, abdominal segments 2–5 with bright green or blue fasciæ; the whole abdomen more cylindrical, not so broad as in the female.

Hab. Burma; Tenasserim; Singapore. ♀ ♂. *Length* 8–10; *exp.* 17–20 mm.

796. **Nomia albofasciata,** *Smith, Trans. Ent. Soc.* 1875, p. 57, ♀; *Dall. Torr. Cat.* x, p. 163.

♀. Head and the mesonotum densely and finely, abdomen more minutely punctured; scutellum large, prominent, shining, nearly impunctate; median segment covered with a short, somewhat fine pubescence, the space at base concave and coarsely longitudinally rugose. Black; the face, the cheeks, the postscutellum, and median segment covered with white pubescence, dense only on the post-scutellum; the legs rufo-piceous, all the tarsi and the posterior tibiæ on the inside ferruginous with pale glittering pubescence; abdomen shining, the apical margins of the basal four segments narrowly white; the flagellum of each antenna, except the basal two joints, fulvo-testaceous; wings hyaline and iridescent, the nervures and tegulæ testaceous.

Hab. Burma; Tenasserim; Java. ♀. *Length* 8–10; *exp.* 16–17 mm. ♂ unknown.

797. **Nomia carinata,** *Smith, Trans. Ent. Soc.* 1875, p. 57, ♀ ; *Dall. Torr. Cat.* x, p. 164.

♀. Head and thorax (except the scutellum) closely and finely, and the abdomen most minutely and densely punctured; scutellum smooth, with a few scattered coarse punctures; the front flat, a short carina between the bases of the antennæ; the clypeus transverse anteriorly; a broad depressed transverse band at the base of the median segment, above coarsely punctured. Black, the antennæ beneath and the legs rufo-fuscous, the posterior tibiæ and tarsi interiorly bright testaceous; the head and thorax with sparse griseous pubescence, the postscutellum covered with a dense pad of pale pubescence, the pubescence on the legs dense, pale, and glittering; the apical margins of abdominal segments 1–4 with greenish-white narrow transverse fasciæ; wings hyaline and iridescent, nervures and tegulæ dark brown.

♂ similar: the abdomen narrower and more cylindrical, segments 2–5 with narrow greenish-white fasciæ; the posterior femora and tibiæ swollen and much curved, the inner apex of each tibia produced into a curved claw of a pale testaceous white colour.

Hab. Rangit Valley, Sikhim; Burma; Tenasserim; Ceylon. ♀ ♂. *Length* 9–10; *exp.* 18–20 mm.

798. **Nomia basalis,** *Smith, Trans. Ent. Soc.* 1875, p. 55, ♀ ; *Dall. Torr. Cat.* x, p. 164.

♀. Head, median segment, and abdomen finely and closely, mesonotum and scutellum coarsely and sparsely punctured; clypeus flat, rounded anteriorly; the median segment very short, vertical and rounded posteriorly; abdomen short and very broad. Chestnut-brown; the face on each side, the sides of the pronotum, the postscutellum, and transverse bands at the base of the 2nd and 3rd abdominal segments covered with dense white pubescence, the legs and a transverse band at the base of the 4th segment with fulvous pubescence; wings hyaline and iridescent.

Hab. India (*Smith*). ♀. *Length* 9; *exp.* 17 mm.

799. **Nomia floralis,** *Smith, Trans. Ent. Soc.* 1875, p. 58, ♀ ; *Dall. Torr. Cat.* x, p. 166.

♀. Head somewhat finely and sparsely, thorax for the greater part and abdomen more densely punctured, on the last the punctures very minute; clypeus flat, produced at apex into a medial tooth and two other very short teeth close to the latter; scutellum prominent, smooth, shining, with only a few scattered punctures; median segment short, vertical posteriorly, with a medial vertical carina, the space at base slightly concave, densely punctured. Black, the basal abdominal segment and apical half of the 2nd pale red; the pubescence on the face, cheeks, and occiput fuscous, on the mesonotum and postscutellum pale fulvous; legs rufo-piceous, the tarsi paler, the pubescence very pale glittering fulvous; the apical margins of the 2nd and following segments with pale fulvous transverse pubescent fasciæ.

Var. The red on the basal two segments reduced to transverse elongate marks in the middle of the segments or in some specimens covering the whole of the two segments.

Hab. China (*Smith*); Rangoon, Burma; Tenasserim. ♀. *Length* 8·5–9; *exp.* 17 mm.

800. **Nomia pilipes,** *Smith, Trans. Ent. Soc.* 1875, p. 56, ♀; *Dall. Torr. Cat.* x, p. 169.

♀. Head and thorax densely pubescent, closely punctured under the pubescence; abdomen slightly shining, with a few scattered punctures at the bases of the segments; clypeus slightly rounded anteriorly, nearly transverse; median segment truncate, pubescent posteriorly, on the sides bare, in the middle, which is smooth, almost impunctate, the space at base concave and very coarsely punctured; abdomen broad, convex. Black, the basal two abdominal segments and basal two-thirds of the 3rd pale red; the antennæ beneath and the legs under the pubescence dull ferruginous brown; the head, the sides of the thorax and of the median segment, the legs, and broad transverse bands on the apical margins of abdominal segments 1–5 with glittering silvery-white pubescence, very long and full on the legs, forming a long scopa on each posterior femur; mesonotum, scutellum, and post-scutellum covered with dense golden-yellow pile; wings hyaline, nervures and tegulæ testaceous.

Hab. Northern India (*Smith*). ♀. *Length* 10; *exp.* 19 mm.

801. **Nomia antennata,** *Smith, Trans. Ent. Soc.* 1875, p. 46, ♀ ♂, pl. i, figs. 9, 9 *a*; *Dall. Tor. Cat.* x, p. 163.
? Nomia sykesiana, *Westw. Trans. Ent. Soc.* 1875, p. 211, pl. iv, fig. 2, ♂.

♀. Head, thorax, and abdomen very minutely and closely punctured; clypeus subtriangular, transverse anteriorly; median segment short, rounded at the sides, truncate posteriorly, the narrow transverse groove along its base longitudinally striate; the apical margins of the basal four abdominal segments broadly subdepressed and pubescent. Black; the face in front and the postscutellum densely and the transverse marginal bands on the basal four abdominal segments less thickly covered with pale yellow pubescence, having a golden lustre in certain lights; the thorax anteriorly above covered with a very short fulvous-red, and the sides and legs with pale somewhat longer pubescence; the 5th abdominal segment with black and the pygidium with short yellow pubescence; wings flavo-hyaline, their apical margins broadly dark fuscous.

Fig. 145.
Nomia antennata, ♂. $\frac{2}{1}$.

♂ similar: a deep constriction above between the 1st and 2nd abdominal segments; the antennæ testaceous, the apical joint dilated, round and flat; the posterior femora and tibiæ incrassate, the latter curved on the inside and each bearing at apex a blunt recurved tooth.

Hab. Bombay. ♀ ♂. *Length* 14–15; *exp.* 22–23 mm.

I have been unable to find any difference, except in the colour of the pubescence, between *N. antennata* and *N. sykesiana*; there is only one specimen labelled "*sykesiana*" in the British Museum, and that is so old and faded that it is impossible to make out whether the original colour of the pubescence was fulvous or white.

802. **Nomia aurifrons**, *Smith, Trans. Ent. Soc.* 1875, p. 43, ♀; *Dall. Torr. Cat.* x, p. 164.

♀. Head densely and finely, thorax minutely punctured; abdomen almost impunctate, slightly shining; clypeus transverse, convex, broadly arched anteriorly; median segment very short, broad and steep, the space at base very narrow, coarsely longitudinally rugose; abdomen oval, massive, convex above. Black; the legs testaceous, the coxæ and femora often rufo-testaceous; the clypeus, front, cheeks, and occiput with pale golden pubescence; the thorax, legs, and apical margins of abdominal segments 1–5 with pale yellowish pubescence, very bright and glittering on the legs; the margins of the segments under the pubescence pale testaceous; the flagellum of each antenna beneath and at apex fulvous; wings hyaline, sometimes light flavo-hyaline, with a very pale fuscescent cloud at apex of the fore wing.

Hab. Bengal; Sylhet; Burma; Tenasserim. ♀. *Length* 8–10; *exp.* 19–20 mm.

803. **Nomia capitata**, *Smith, Trans. Ent. Soc.* 1875, p. 54, ♂; *Dall. Torr. Cat.* x, p. 164.

♂. Head, thorax, and abdomen somewhat closely and finely punctured, pubescent; clypeus subporrect, very widely emarginate; median segment rather long, rounded, and steeply sloped posteriorly, the space at base coarsely punctured; abdomen ovate, the apical margin of the basal segment slightly constricted. Black; the head in front, the thorax on the sides and on the scutellum, and transverse fasciæ on the apical margins of abdominal segments 1–5 with pale fulvous pubescence, the pubescence on the median segment and beneath cinereous; the mandibles, the flagellum of the antennæ, and the legs pale ferruginous, the apex of the flagellum rufo-piceous; the posterior femora not swollen, the inner sides of the posterior tibiæ at apex only slightly produced; wings hyaline and iridescent.

Hab. Northern India; Ceylon (*Green*). ♂. *Length* 5; *exp.* 9 mm.

804. **Nomia combusta**, *Smith, Trans. Ent. Soc.* 1875, p. 56, pl. ii, fig. 9, ♂ leg; *Dall. Torr. Cat.* x, p. 165.

♂. Head above coarsely and closely punctured; thorax covered with a very short dense pubescence; abdominal segments 1–5 bare and opaque in the middle, with a few fine punctures; clypeus rounded anteriorly; median segment truncate posteriorly, the sides rounded, slightly convergent posteriorly, and punctured, the space at base concave and punctured; abdomen narrowed towards the base. Intense black, the antennæ and legs rufo-testaceous; the posterior femora greatly swollen and toothed at the apex internally; each tibia broadened towards apex, the inner angle at apex produced; the clypeus and front, the cheeks, the pronotum posteriorly, a spot behind each of the tegulæ, the postscutellum, the sides of the thorax and of the median segment, and the broad apical margins of abdominal segments 1–6 covered with dense short glistening golden pubescence; the scutellum and the bases of abdominal segments 1–3 covered with dense ferruginous pile; the pubescence on the legs sparse, forming a broad pale fringe to the anterior tarsi; wings fulvo-hyaline, nervures rufo-testaceous.

Hab. Bombay. ♂. *Length* 11–13; *exp.* 21–22 mm.

805. **Nomia clypeata**, *Smith, Trans. Ent. Soc.* 1875, p. 54, ♂, pl. ii, fig. 18; *Dall. Torr. Cat.* x, p. 165.

♂. Head, thorax, and abdomen finely and closely punctured; clypeus slightly produced, transverse anteriorly; median segment rounded and steep posteriorly, depressed much below the level of the postscutellum, the space at base very wide, concave, and very coarsely punctured; the apical margins of the segments of the abdomen depressed. Black; the apex of the clypeus, the mandibles, and flagellum of the antennæ ferruginous; the apical margins of the abdominal segments rufo-piceous; the face below the antennæ and the postscutellum covered with white pubescence; the mesonotum and transverse fasciæ on the apical margins of abdominal segments 1–5 and the whole of the 6th segment above covered with pale fulvous pubescence; the posterior femora slightly swollen; the posterior tibiæ subtriangular, the apex of each on the inside slightly produced and rounded; wings hyaline and iridescent, nervures and tegulæ rufo-piceous.

Hab. Bengal; Burma. ♂. *Length* 8; *exp.* 15 mm.

806. **Nomia fervida**, *Smith, Trans. Ent. Soc.* 1875, p. 55, ♂, pl. ii, fig. 12; *Dall. Tor. Cat.* x, p. 166.

♂. Head on the vertex, thorax, and abdomen closely and finely punctured, opaque; clypeus very slightly convex, rounded anteriorly; median segment truncate posteriorly, the sides slightly compressed, the space at base moderately wide, coarsely reticulate. Black, the antennæ fulvous; the femora beneath, the tibiæ and tarsi yellow; the clypeus and front up to the anterior ocellus, the

cheeks, a broad transverse band on the mesonotum anteriorly, a fine line over the tegulæ, the postscutellum, the sides of the thorax and of the median segment, and broad transverse bands on the apical margins of the 1st–6th abdominal segments covered with dense very short pale fulvous pubescence; the posterior femora and tibiæ swollen and incrassate, the former each with a tooth on the inside, the latter each with a castaneous spot on the outer and inner side near the base; wings hyaline, slightly fuscescent.

Hab. The Deccan, India. ♂. *Length* 10; *exp.* 18 mm. ♀ unknown.

807. **Nomia oxybeloides,** *Smith, Trans. Ent. Soc.* 1875, p. 42, ♀ ♂, pl. i, figs. 6, 6 *a*; *Dall. Torr. Cat.* x, p. 168.

♀. Head densely and finely, thorax more sparsely and coarsely punctured; abdomen shining; clypeus anteriorly slightly arched, flat; tegulæ very large, longer than broad; median segment rounded at the sides, steeply truncate posteriorly and more closely punctured than the mesonotum, the space at base very narrow, with a row of single deep coarse punctures; each of the basal three abdominal segments above with an obscure transversely impressed line. Black; the apical joints of the tarsi and sometimes the whole of the posterior tibiæ and tarsi testaceous; the clypeus and head in front, the legs on the outside, a line on the pronotum, the postscutellum, and the margins of the abdominal segments with glittering silvery-white pubescence, the pubescence on the thorax often fulvous.

♂ similar, smaller, the pubescence with a fulvous tint; the posterior femora and tibiæ much swollen, the inferior apical angle of each of the latter produced into a flat, long process, testaceous white in colour, rounded on the outside, the inner border straight; wings in both sexes hyaline, nervures and tegulæ testaceous.

Hab. Bengal; Bombay; Punjab: Karáchi, extending to Aden. ♀ ♂. *Length* 6·5–8; *exp.* 14–16 mm.

808. **Nomia rustica,** *Westw. Trans. Ent. Soc.* 1875, p. 214, ♂; *Dall. Torr. Cat.* x, p. 169.

♂. Head finely, thorax minutely and delicately punctured; abdomen nearly smooth; the base of the 2nd segment slightly depressed, very minutely punctured, followed by a row of scattered coarser punctures; clypeus subconvex, transverse anteriorly; median segment rounded posteriorly, with a slight medial carina, dividing above and enclosing a space at the base which is obscurely transversely striate. Black; the face and cheeks with a thin white pubescence; the flagellum of the antennæ castaneous brown; the thorax above with short griseous pubescence; the posterior femora slightly swollen, each posterior tibia subtriangular, the inner angle of the apex slightly produced; the apical margins of abdominal segments 2–5 narrowly whitish; wings flavo-hyaline, nervures and tegulæ dark brown.

Hab. Ceylon. ♂. *Length* 8; *exp.* 15 mm.

*809. **Nomia vincta,** *Walker, A. M. N. H.* (3) v, 1860, p. 305, ♀; *Dall. Torr. Cat.* x, p. 170.

"♀. Black, dull, broad, thick, very closely and minutely punctured, with cinereous pubescence. Mouth testaceous, black at the base; antennæ subclavate, as long as the head; abdomen elliptical, shining, very finely punctured, a little longer and broader than the thorax, with three bands of cinereous tomentum; tarsi pale beneath; wings cinereous, veins and stigma black, third cubital areolet much less than twice the length of the second.

"Length of the body 3½ lines (= about 8 mm.), of the wings 6 lines (= about 13 mm.)."

Hab. Ceylon. Unknown to me. Possibly a *Halictus.*

810. **Nomia scutellata,** *Smith, Trans. Ent. Soc.* 1875, p. 45, ♀; *Dall. Torr. Cat.* x, p. 169.

♀. Head, thorax, and abdomen finely, densely, but lightly punctured; clypeus somewhat produced, arched anteriorly; median segment rounded posteriorly, the middle narrowly truncate, the space at base concave and transversely finely striate; abdomen with the margins of the segments subdepressed. Black; the clypeus and front, the cheeks, sides of the thorax, legs, and transverse broad bands on the posterior margins of abdominal segments 1–5 with cinereous pubescence, inclining to yellowish on the clypeus and front, and fulvous about the base of the antennæ; the thorax above and base of abdomen with rufo-fulvous pubescence, dense on the scutellum and postscutellum; wings hyaline, nervures and tegulæ testaceous.

Hab. Calcutta; Burma. ♀. *Length* 7–8; *exp.* 14–16 mm. ♂ unknown.

811. **Nomia aurata,** n. sp.

♀. Head and thorax somewhat coarsely and closely, abdomen more minutely and very densely punctured; clypeus not carinate, flat, transverse anteriorly; median segment concavo-truncate posteriorly, the space at base finely reticulate. Black; the flagellum of the antennæ at apex beneath, the legs, and the apical margins broadly of the ventral abdominal segments rufo-testaceous; the clypeus, face, cheeks, sides of the thorax and of the median segment, the postscutellum, and the apical margins narrowly of abdominal segments 2–4 covered with cinereous pubescence; the legs with pale glittering pubescence; wings hyaline and iridescent.

♂ similar, smaller; the clypeus and front with rich golden pubescence, the basal three ventral segments pale testaceous red; the posterior femora and tibiæ swollen, the inner apical angle of the latter produced into a claw-like process; the legs black, the anterior tarsi, the basal and apical joints of the intermediate and posterior tarsi, and the produced claw-like process at apex of the posterior tibiæ pale testaceous; the apical margin of the 1st abdominal segment constricted, the following four segments with a narrow transverse white fascia at apex.

Hab. Tenasserim. ♀. *Length* 9–10; *exp.* 19–20 mm. ♂. *Length* 8; *exp.* 17 mm.

A very distinct species.

812. **Nomia terminata,** *Smith, Trans. Ent. Soc.* 1875, p. 56, ♂; *Dall. Torr. Cat.* x, p. 170.

♀. The head, thorax, the basal half or two-thirds of abdominal segments 1–5 and the whole of the 6th segment above very minutely and densely punctured, the punctures at the base of the scutellum coarser and more sparse; the clypeus broad, convex, somewhat roundly truncate anteriorly, with a slight but distinguishable medial vertical carina; a narrow furrow along the base of the median segment longitudinally striate. Dark castaneous brown; the clypeus and sides of the face, the sides of the thorax and of the median segment, the sides of the scutellum, the postscutellum, the legs, the base and sides above and the ventral segments of the abdomen with glistening fulvous golden pubescence, very dense and shining on the legs and on the abdomen beneath, the apical three segments above with a thin covering of soft fuscous black hairs; wings flavo-hyaline, fore wing with a fuscous cloud at apex, nervures and tegulæ testaceous.

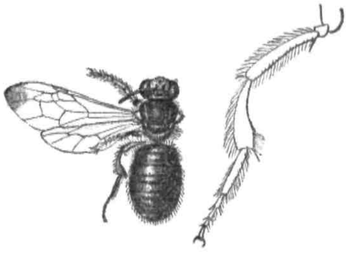


Fig. 146.—*Nomia terminata*, ♂. $\frac{3}{2}$.

♂ similar, narrower in form; the scutellum tuberculate at its lateral angles; posterior tibiæ strongly curved, flattened and broad inwardly at apex.*

Hab. Sikhim; Burma; Tenasserim. ♀ ♂. *Length* 12–13; *exp.* 26 mm.

813. **Nomia fuscipennis,** *Smith, Trans. Ent. Soc.* 1875, p. 57, ♀.

♀. Head above and thorax moderately, finely, and closely, 2nd and following abdominal segments more finely punctured; clypeus very coarsely but superficially rugose-punctate, its anterior margin transverse; median segment vertical, rounded posteriorly, the middle slightly flat, a deep groove along the base, above longitudinally rugose; the basal abdominal segment entirely and the apical margins of segments 2–4 broadly smooth, impunctate, shining. Black, with a deep castaneous hue in certain lights; the flagellum of the antennæ at apex beneath and the tibiæ obscurely fulvo-piceous; the head in front and beneath, the sides of the

* *N. buddha*, Westw. (Trans. Ent. Soc. 1875, p. 209, pl. iv, fig. 1 ♂), of which the habitat is given as "India orientalis," should, I think, be deleted from the Indian list: it is, I believe, African.

thorax, and legs with a pale brownish pubescence; the posterior femora each with a long curled floccus of pale hairs, the inside of the posterior tibiæ and tarsi densely pubescent, the pubescence with a rich golden sheen in certain lights; wings brownish fuscous, with a darker cloud at the apex of the fore wing.

Hab. Sumatra; Sikhim. ♀. *Length* 13; *exp.* 26 mm.

Genus STEGANOMUS.

Steganomus, *Rits. Tijd. v. Ent.* viii, 1873, p. 224.
Cyathocera, *Smith, Trans. Ent. Soc.* 1875, p. 47.

Type, *S. javanus*, Rits.

Range. The Oriental region.

Head subovate, as wide as the thorax, the ocelli in a curve on the vertex; eyes slightly convergent beneath; antennæ short, filiform in the female, longer, with the apical two segments in the male dilated, spatulate and discoid at apex; mandibles bidentate in the female, simple and acute at apex in the male; labial palpi 4-jointed; maxillary palpi 6-jointed, the latter decreasing sensibly both in width and length from base to apex. Thorax ovate, the posterior femora (♀) with a floccus of long hair; in ♂ swollen, the posterior tibiæ also dilated towards the apex, the inferior apical angle produced: wings with the radial cell somewhat narrow, oblong; two cubital cells, the 2nd receiving both recurrent nervures, and narrowed above by the convergence of the 1st and 2nd transverse cubital nervures. Abdomen subovate.

Fig. 147. *Steganomus nodicornis*, ♂. $\frac{3}{2}$.

814. **Steganomus nodicornis**, *Smith, Trans. Ent. Soc.* 1875, p. 47, ♀ ♂, pl. i, figs. 5, 5 *a*, 5 *b*.

♀. Head, the clypeus with a few coarse large punctures, vertex more closely punctured; thorax and abdomen smooth, but opaque; the clypeus nearly transverse, anteriorly flat; median segment short, very steeply rounded at the sides, the middle truncate; abdomen ovate, the apical margins of segments 1–5 slightly but broadly depressed. Head, thorax, coxæ, and the basal margins of abdominal segments 3–5 above black; the antennæ and the rest of the legs and of the abdomen ferruginous red; the face as high as the ocelli, the cheeks, and the apical margins broadly of the 3rd (sometimes the 4th) and following abdominal segments covered with rich golden pubescence; the pronotum, a narrow line at the base of the scutellum, the postscutellum, the sides of the median segment, and the legs with yellow pubescence, very glittering and bright on the legs; the 2nd to 4th abdominal segments with lateral oblong spots of white pubescence, generally more or less abraded; wings subhyaline, broadly dark fuscous along the apical margin, nervures pale testaceous; tegulæ remarkably large, shining ferruginous.

♂ similar, the vertex of the head finely, the abdominal segments

where not covered by the pubescence densely and somewhat coarsely punctured; antennæ very much longer, the spatulate apical two segments black; the posterior femora swollen, the posterior tibiæ dilated at their apical half, the apex on the underside compressed into a thin round flat plate.

Hab. Barrackpore, Bengal; Lucknow; Allahabad. ♀ ♂. *Length* 8–9; *exp.* 16–17 mm.

Genus CTENOPLECTRA.

Ctenoplectra, *Smith, Jour. Linn. Soc.* 1858, p. 44.

Type, *C. chalybea*, Smith.

Range. Burma, the Malayan subregion, and South and East Africa.

Head transverse, antennæ inserted about the middle of the face, short, filiform; 2nd joint of the flagellum of the antennæ constricted at the base; ocelli placed in a curve forward on the vertex; labrum prominent, rounded; labial palpi 4-jointed, the basal two joints stout, subequal, apical two shorter and more slender; maxillary palpi 6-jointed, basal three joints stout and of equal length, apical joints more slender, each decreasing in length from the preceding one. Thorax large and ovate: wings—the radial cell in the fore wing acute at apex; two cubital cells, the 2nd strongly narrowed above towards the radial, receiving both recurrent nervures: legs with the femora broad and compressed, the inner calcar of the posterior tibiæ (♀) lunate in shape and finely toothed on the inside; the posterior tibiæ and basal joint of the tarsi clothed with dense long pubescence. Abdomen broad, subovate, truncate at base, the apical segment in the male trilobed.

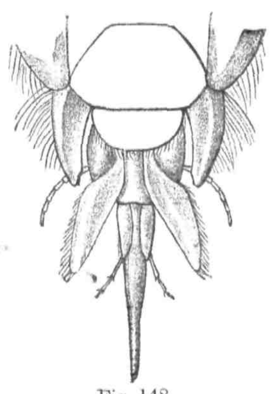


Fig. 148.
Ctenoplectra apicalis, ♂.
(Mouth-parts, much enlarged.)

I found *C. chalybea*, Smith, collecting clay at muddy pools in the road, and once or twice saw it conveying pieces of circularly cut leaves to a hole in the wooden walls of a house in the Tenasserim forests.

Key to the Species.

a. Abdomen metallic blue.
  a'. Apical margins broadly of basal two segments of abdomen shining castaneous brown .... *C. apicalis*, p. 462.
  b'. Apical margins of basal two abdominal segments not castaneous brown; abdomen entirely deep blue .... *C. chalybea*, p. 462.
b. Abdomen black, not metallic blue .... *C. cornuta*, p. 462.

815. **Ctenoplectra apicalis**, *Smith, New Sp. Hym. B. M.* p. 57, ♂; *Dall. Torr. Cat.* x, p. 195.

♂. Head, thorax, and the bases broadly of the abdominal segments above finely and closely punctured, the apical margins of abdominal segments 1–6 smooth; clypeus slightly emarginate anteriorly, vertically carinate medially, the labrum beneath arched anteriorly; median segment short, vertical, indistinctly raised but not carinate down the middle; apical abdominal segment broad, trilobed, bent downwards, and then recurved. Head, thorax, and legs dark castaneous brown; the median segment with short fuscous, the legs with black pubescence, dense and long on the outside of the posterior tibiæ and tarsi; abdomen brilliant metallic blue, highly polished and shining, the apical margins of the basal two segments broadly, and of the 3rd narrowly castaneous brown; wings subhyaline with a smoky tint.

Hab. Burma. ♂. *Length* 14·5; *exp.* 26 mm.

816. **Ctenoplectra chalybea**, *Smith, Jour. Linn. Soc.* 1858, p. 45, ♀; *Dall. Torr. Cat.* x, p. 195.

♀. Head above and thorax very minute and closely punctured, shining, the clypeus and the scutellum more sparsely and coarsely punctured; abdomen brilliantly polished and shining; the clypeus broad, convex, transverse anteriorly; median segment steeply sloped, slightly truncate and flat in the middle posteriorly. Black, the abdomen deep shining metallic blue: the face on each side and the median segment with a little white pubescence; the pubescence on the legs black; the ventral segments with a number of thread-like black bristles; wings hyaline, nervures and tegulæ black.

Fig. 149.—*Ctenoplectra chalybea*, ♀. $\frac{3}{2}$.

Hab. Pegu hills, Burma; Tenasserim, extending to Malacca and Celebes. ♀. *Length* 10–13; *exp.* 22–25 mm.

*817. **Ctenoplectra cornuta**, *Gribodo, Bull. Soc. Ent. Ital.* xxiii, 1891, p. 102, ♀; *Dall. Torr. Cat.* x, p. 195.

"♀ of rather small size, intensely black in colour all over; head and thorax moderately, abdomen remarkably shining and polished; head as wide as the thorax, densely punctured, especially on the clypeus, and covered with sparse grey pubescence, furnished at the sides of the clypeus with two prominent horn-like projections; thorax smoky black, somewhat closely and finely punctured, the lines of articulation between the parts very minutely punctured, the upper horizontal parts of the median segment very densely subrugosely, and the vertical portion sparsely punctured and shining; basal three abdominal segments above subglabrous,

impunctate; 5th segment lightly but closely punctured, opaque, with a fuscous fimbria of pubescence on its apical margin; epipygium covered with dense fuscous pubescence, the apex of the triangular pygidial area produced, the base broadly carinate; the ventral segments ciliated with fuscous hairs; the legs smoky black with stiff hairs or pubescence, the scopa somewhat dense, fuscous black; wings hyaline, sometimes infuscate, nervures fuscous.

"*Hab.* The Shan hills, Upper Burma. ♀. *Length* 9 mm."

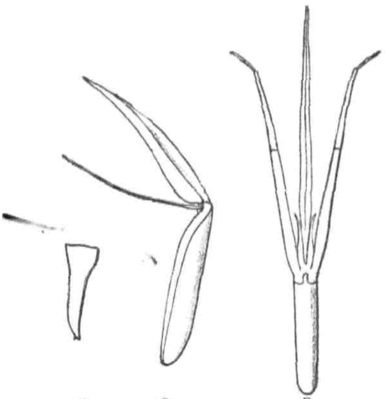
Genus **NOMADA**.

Nomada, *Scop. Ann. Hist. Nat.* iv, p. 44 (1770).

Type, *N. fabriciana*, Linn.

Range. Both hemispheres.

Head transverse, not as wide as the thorax; eyes comparatively large; front broad, the inner orbits wide apart and slightly arched outwards; antennæ filiform, geniculate; ocelli in a triangle on the vertex; clypeus slightly porrect in all the Indian species; labrum transverse, rounded anteriorly; the tongue long and acute; labial palpi 4-jointed, basal joint about equal in length to the apical three united; maxillary palpi 6-jointed, basal joint short, subclavate, 2nd longest, 3rd slightly shorter than the 2nd, remainder decreasing in length to the apical joint. Thorax ovate; fore wing with the radial cell narrowed in its apical half, the apex acute; three cubital cells, the 1st equal in length to the 2nd and 3rd united, the latter both constricted strongly towards the radial cell by the curving towards each other of the 2nd and 3rd transverse cubital nervures, the 2nd cell receives the 1st recurrent nervure about the middle, the 3rd cell the 2nd recurrent nervure a little beyond the middle; legs stout, naked; abdomen subclavate, more or less narrowed towards the base, sometimes subpetiolate.



1 2 3

Fig. 150.—*Nomada.* 1, mandible; 2, maxilla; 3, labium. (Much enlarged.)

Of the Indian species, *Nomada lusca*, Smith, has been observed by Mr. E. E. Green, of Pundaloya, Ceylon, parasitic in the nests of *Halictus ducalis*, Bingh. Smith, in his Catalogue of British Hymenoptera in the Coll. British Museum, has a most interesting account of the habits of the British species.

Key to the Species.

a. Median segment with an oblong yellow spot on each side .... *N. decorata*, p. 464.
b. Median segment immaculate.
  a'. Apical margins of abdominal segments 1–5 broadly depressed, smooth, and shining .... *N. solitaria*, p. 464.
  b'. Apical margins of abdominal segments not depressed.
    a². Whole abdomen smooth, impunctate .... *N. lusca*, p. 465.
    b². Basal abdominal segment smooth, remainder closely and finely punctured along bases of segments .... *N. adusta*, p. 465.

*818. **Nomada decorata**, *Smith, Cat.* ii, p. 243, ♀; *Dall. Torr. Cat.* x, p. 342.

"♀. Length 4½ lines (=about 10–11 mm.). Head and thorax black; the anterior margin of the clypeus, sides of the face, orbits of the eyes, slightly interrupted at their vertex, the labrum, mandibles, and scape in front orange-yellow; the flagellum beneath and its apical joint ferruginous; otherwise fuscous above. The collar, tubercles, scutellum, postscutellum, and an oblong macula on each side of the metathorax yellow, having more or less of a ferruginous stain; legs yellow varied with ferruginous; the coxæ and trochanters above, the posterior femora beneath, and the basal joint of the posterior tarsi above, black; wings subhyaline, slightly clouded at their apical margins, their nervures ferruginous. The basal segment of the abdomen black above, having a broad yellow fascia, its apical margin ferruginous; the rest of the abdomen ferruginous, each segment having a broad yellow band, that on the 2nd segment attenuated in the middle; the fascia continued beneath the abdomen.

"*Hab.* Northern India (coll. J. S. Baly, Esq.)."

819. **Nomada solitaria**, *Smith, Cat.* ii, p. 243, ♂; *Dall. Torr. Cat.* x, p. 369.

♂. Head and thorax opaque, finely and very closely, abdomen more minutely and densely punctured and shining; clypeus subtriangular, convex, transverse anteriorly; labrum large, bent at an angle to the clypeus; median segment slightly convex, with a medial vertically impressed line, on each side of which at the junction of the sides with the posterior face of the segment is a carina obliquely diverging upwards; abdomen with the margins of segments 1–5 broadly depressed, smooth and impunctate. Black; the apical margin of the clypeus, the labrum, mandibles, sides of the face below the antennæ, the scape of the last in front, a line on the pronotum, the tubercles, a spot on the tegulæ, two large square contiguous spots on the scutellum, the apex of the femora, the tibiæ and tarsi of the anterior legs, the apex of the femora and the tibiæ of the intermediate legs, the apex of both femora

and tibiæ inside of the posterior legs, and subapical transverse bands on abdominal segments 1–6 yellow; the clypeus, face, cheeks, sides of the median segment, and the coxæ covered with a short silvery-white pubescence; antennæ fulvous beneath; wings hyaline and iridescent.

Hab. Northern India. ♂. *Length* 12; *exp.* 22 mm.

820. **Nomada lusca**, *Smith, Cat.* ii, p. 243, ♀; *Dall. Torr. Cat.* x, p. 356; *Bingh. P. Z. S.* 1896, p. 455.

♀. Head and thorax finely and very densely punctured, abdomen smooth and shining; clypeus flat, transverse anteriorly; median segment depressed, not very steeply sloped, the space at base obliquely striate. Ferruginous brown, the basal abdominal segment subpetiolate, with a black spot on each side; wings fusco-hyaline, darkest along their apical margins.

Var. A transverse yellow band or two contiguous yellow spots across the middle of the 1st and along the basal margin of the 2nd abdominal segment.

Hab. Sikhim; Tenasserim; Ceylon; Philippines. ♀. *Length* 7; *exp.* 14 mm. The variety described above is the common Indian form, and seems to be the link between the unicolorous Philippine insect and the Indian *N. adusta*, Smith.

821. **Nomada adusta**, *Smith, Trans. Ent. Soc.* 1875, p. 50, ♀ ♂; *Dall. Torr. Cat.* x, p. 335.

Nomada subpetiolata, *Smith, New Sp. Hym. B. M.* p. 99, ♀.

♀. Head and thorax densely punctured, giving them a granular appearance; basal abdominal segment smooth and polished, 2nd and following segments minutely and densely punctured, broadly along their base; the clypeus flat, transverse anteriorly, the sides rounded; an obscure short medial vertical carina beween the bases of the antennæ; median segment rounded posteriorly and steep, the space at base densely and somewhat coarsely punctured; the punctures running into oblique striæ; Ferruginous; the clypeus and sides of the face nearly to the top of the eyes, the scape of the antennæ in front, a line on the collar, the tubercles, tegulæ, scutellum, postscutellum, a large spot on each side at base of 2nd abdominal segment, sometimes forming a subinterrupted broad fascia, a fascia at base of 3rd, and two contiguous spots at base of 4th segment, yellow; the basal abdominal segment with a black spot on each side; the face, sides of the thorax and of the median segment, and the 6th abdominal segment with a thin silvery-white pubescence; wings hyaline, fuscous at their apical margins.

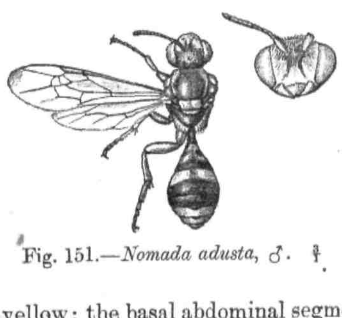


Fig. 151.—*Nomada adusta*, ♂. †

Var. A broad medial longitudinal stripe having a depressed, grooved appearance, on the mesonotum, the intermediate and posterior femora at base, and the apical margins of abdominal segments 1–3 black.

♂ similar; slightly smaller and altogether darker.

Hab. Western India; Ceylon; Barrackpore, Bengal; Tenasserim. ♀. *Length* 7–8; *exp.* 16 mm. ♂. *Length* 6; *exp.* 14 mm.

Genus SYSTROPHA.

Systropha, *Klug, Illig. Mag. Ins.* v, p. 146 (1805).

Type, *S. curvicornis*, Scop.

Range. Europe; Asia Minor; Egypt; Burma; Tenasserim.

Head not so broad as the thorax, front broad; the eyes small, their inner orbits parallel; ocelli placed in a curve on the anterior verge of the vertex; antennæ filiform, the flagellum of the female slightly thickened, the apical three joints in the male curved and forming an equilateral triangle; labial palpi 4-jointed; maxillary palpi 6-jointed. Thorax orbicular, short; median segment rounded posteriorly; legs stout, the posterior tibiæ in males incrassate: wings broad, ample; fore wing with the radial cell broad at base, subacute at apex, which is approximate to the costal margin; three cubital cells, the 1st cell the largest, the 2nd narrowed and angular at base, the 3rd strongly narrowed towards the radial cell. Abdomen large and comparatively broad, the 2nd and 3rd segments produced laterally, almost tuberculate: the 2nd ventral segment with a prominent wedge-shaped tubercle beneath.

Fig. 152.
Systropha difformis, ♂. $\frac{3}{1}$.

Nothing has been recorded of the habits of the only Indian species known. I found the males frequenting the flowers of what looked like a species of spurge in the beds of dry streams in Tenasserim. I never came across the female.

822. **Systropha difformis**, *Smith, New Sp. Hym. B. M.* p. 60, ♂; *Dall. Torr. Cat.* x, p. 192.

♂. Head, thorax, and abdomen pubescent, and finely but somewhat sparsely punctured; clypeus transverse, much broader than high, rounded anteriorly, and ciliated with soft hairs; the front from the anterior ocellus to the base of the clypeus raised into a broad but not very prominent vertical ridge; median segment with a sublunate depressed space at base; abdomen with a marked subapical constriction transversely across the middle of each of the basal three segments, the sides of the 2nd prominently produced, of the 3rd segment more slightly, nearly forming lateral tubercles; the 2nd ventral segment with a remarkable wedge-

shaped projection which is narrowed at base and obliquely concave at apex. Jet-black and shining, the apical three joints of the flagellum of the antennæ light testaceous; the whole head, thorax, and abdomen covered with a thin soft hoary pubescence; wings hyaline, lightly fuscescent.

Hab. Burma; Tenasserim. ♂. *Length* 10–12; *exp.* 21–23 mm. ♀ unknown.

Genus **THAUMATOSOMA**.

Thaumatosoma, *Smith, Trans. Ent. Soc.* ser. 3, vol. ii, 1865, p. 394.

Type, *T. duboulaii*, Smith.

Range. Australia; Burma.

♂. Head orbicular, about as wide as the thorax; ocelli in a broad triangle, nearly in a curve, on the vertex; labial palpi 4-jointed, basal two joints subequal, elongate, the apical two minute, placed at an angle near the apex of the 2nd joint; maxillary palpi 2-jointed, minute, basal joint stout, apical thinner, pointed at apex; the apical lobe of the maxilla twice the length of the basal lobe; antennæ with the scape short, thick, the flagellum with the apical joint dilated, flat and thin, the rest of the joints either all slender, filiform and elongate, or the basal seven normal and the subapical four suddenly attenuated and filiform. Thorax ovate; legs moderately stout: the fore wing with the radial cell narrow, rounded at base and apex; two cubital cells, the 2nd receiving both recurrent nervures, the 1st near the base, the 2nd near the apex. Abdomen cylindrical, the apical segments curved downwards, the 7th segment medially strongly carinate, the carina ending in a blunt spine, the sides of the segment also produced and forming incurving blunt teeth on each side; basal segment beneath produced and having a strong blunt tooth on each side.

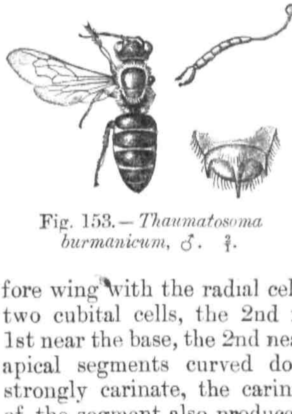


Fig. 153.—*Thaumatosoma burmanicum*, ♂. $\frac{2}{1}$.

In the paper in the Trans. Ent. Soc. containing a diagnosis of the genus *Thaumatosoma*, Smith also described an insect from South America under the name *Eucera mirabilis*, the antennæ of which still more closely resemble those of the insect described below. No specimen of this so-called *Eucera* is in the British Museum, but I have little doubt that it also agrees best, as does the Burman insect, with the characters, especially of the mouth-parts, of the genus *Thaumatosoma*.

823. **Thaumatosoma burmanicum**, n. sp.

♂. Head, thorax, and abdomen finely and closely punctured and more or less pubescent, the head in front densely so; median segment short, truncate posteriorly, the sides rounded. **Black; the**

pubescence on the head in front and the thorax white, slightly fulvous; the scape, the basal two and subapical four filiform joints of the flagellum of the antennæ, and the femora above and tibiæ of the anterior and intermediate legs testaceous red; the rest of the antennæ and legs nigro-piceous; the pubescence on the legs and transverse bands, widening laterally on the apical margins of abdominal segments 1–5, greyish white; wings fusco-hyaline, nervures and tegulæ dark piceous brown.

Hab. Rangoon, Lower Burma; Tenasserim. ♂. *Length* 9; *exp.* 17 mm.

Genus OSMIA.

Osmia, *Panz. Krit. Revis. Faun. Deutschl.* ii, p. 230 (1806).
Amblys et Hoplitis, *Klug, Illig. Mag. Ins.* vi, pp. 225 & 226 (1807).

Type, *O. rufa*, Linn.

Range. Both hemispheres.

Head not quite so wide as the thorax, subglobose; ocelli placed in a curve on the vertex; antennæ filiform, the scape slightly incrassate; the mandibles stout, with teeth at apex; labrum oblong; tongue elongate; labial palpi 4-jointed, the 1st joint shorter than the 2nd, the apical two minute; maxillary palpi 4-jointed, basal joint stout, 2nd longer than the 1st, 2nd and 3rd subclavate, apical joint minute. Thorax short; fore wing with the radial cell acute at apex and slightly appendiculate; two cubital cells, the 2nd receiving the 1st recurrent nervure between base and middle, the 2nd near the apex; legs moderately stout and long. Abdomen oblong, convex above, densely pubescent beneath in the female; in the male the apical segment dentate.

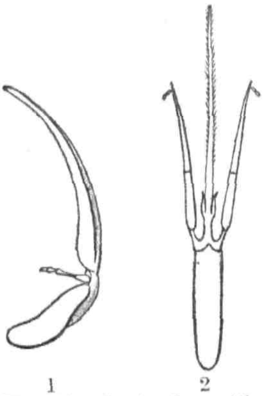

1 2

Fig. 154.—*Osmia*. 1, maxilla; 2, labium. (Much enlarged.)

Nothing is known of the habits of the sole species of *Osmia* as yet known from India. The European species construct their nests variously in the earth of banks, in dry bramble branches, in old posts and railings, in snail-shells, &c.

824. **Osmia adæ**, n. sp. (Pl. III, fig. 10.)

♂. Head, thorax, and abdomen very finely and closely punctured, granular; the abdomen shining, the margins of segments 1–5 slightly constricted; clypeus slightly convex, rounded anteriorly; median segment concavo-truncate posteriorly, the apical segment of the abdomen bidentate. Dark shining metallic blue; the mandibles, antennæ, and tarsi piceous black; the clypeus and front, the cheeks and occiput, and the sides of the thorax and of

the median segment covered with long soft white pubescence; the legs and sides and apex of the abdomen with shorter, more sparse glistening silvery pubescence; wings hyaline, nervures piceous.

Hab. Kumaun, N.W. Himalayas (*Miss Ada Brook*). ♂. *Length* 10; *exp.* 18 mm.

Genus LITHURGUS.

Lithurgus, *Latr. Fam. Nat. du Règne Anim.* p. 463 (1825).

Type, *L. cornutus*, Fabr.

Range. Both hemispheres.

Head as broad as the thorax; the inner orbits of the eyes parallel or very slightly convergent below; mandibles narrow, thick, not flattened as in *Megachile*, tridentate at apex; labial palpi 4-jointed; maxillary palpi 4-jointed; face between the antennæ tuberculate; vertex rounded, the ocelli placed in a triangle on the front below it: thorax as in *Megachile*; legs stouter, generally with longer pubescence in the female; wings exactly as in *Megachile*; abdomen broad, flattened and depressed above, more convex beneath than in *Megachile*.

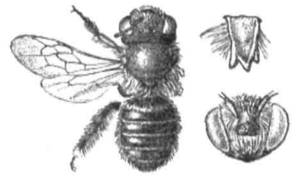


Fig. 155.
Lithurgus atratus, ♀. $\frac{3}{2}$.

The habits of one of the Indian species, *L. dentipes*, Smith, are said by Horne (Trans. Zool. Soc. vii, p. 175) to be similar to those of *Megachile*.

Key to the Species.

a. Posterior tibiæ coarsely rugose on outer side.. *L. atratus*, p. 469.
b. Posterior tibiæ finely punctured on outer side. *L. dentipes*, p. 470.

825. **Lithurgus atratus**, *Smith, Cat.* i, p. 145, ♀; *Dall. Torr. Cat.* x, p. 415.

♀. Head and thorax transversely rugose; abdomen shining, sparsely punctured, the punctures shallow; clypeus strongly punctured, produced into a triangular prominent tubercle at base, arched anteriorly, and fringed with a thick tuft of pubescence; the posterior tibiæ coarsely rugose above; the 2nd abdominal segment constricted at base, the apical margins of segments 2–5 narrowly subdepressed. Jet-black; the apex of the clypeus, the face on both sides the pronotum, the sides and apex of the median segment, and base of the abdomen with a thin soft white pubescence; the legs black with black pubescence; the apical margins of segments 1–5 fringed with white pubescence, on the basal segment this is broadly interrupted in the middle; the apical segment with black pubescence above; the pollen-brush thin, from a brownish red to black in different specimens; wings fusco-hyaline, with a slight purple effulgence.

Hab. Allahabad; Dehra Dun; Karáchi; Bangalore; Ceylon; Burma; Tenasserim. ♀. *Length* 11–13; *exp.* 20–24 mm.

826. **Lithurgus dentipes,** *Smith, Cat.* i, p. 146, ♂; *Dall. Torr. Cat.* x, p. 416.

♀. Allied to and closely resembling *L. atratus*, but a narrower, somewhat smaller species; the punctures on the head and thorax and on the outside of the tibiæ are much finer; the abdomen is more convex, not so flat; and above all the legs are very much stouter, the femora and tibiæ of the intermediate and posterior legs considerably thickened, the former being deeply channelled and bidentate near the apex on the underside. Black, the apical six joints of the antennæ and the abdomen obscurely piceous, the apical margins of segments 1–5 paler; the pubescence white as in *L. atratus*, the 6th segment covered with fuscous-black pubescence; the pollen-brush always black.

♂ similar; the face with pale yellow, the disc of the mesonotum with ochreous pubescence, the apical joints of the tarsi rufo-testaceous.

Hab. Sikhim; Mainpuri, N.W.P. (*Horne*); Tenasserim; New Holland (*Smith*). ♀. *Length* 10–12; *exp.* 20–22 mm. ♂ slightly smaller.

Genus MEGACHILE.

Megachile, *Latr. Hist. Nat. Ins.* iii, p. 382 (1802).
Trachusa, pt., *Jurine, Hym.* p. 247 (1807).
Chalicodoma, pt., *Lepel. Hym.* ii, p. 309 (1841).

Type, *M. centuncularis*, Linn.

Range. All parts of the world.

Head variable, generally as wide as the thorax; mandibles stout, broad and flattish towards apex, with 4 teeth, the exterior tooth acute; ocelli in a triangle placed forward on the vertex; antennæ filiform, geniculate; labial palpi 4-jointed, basal two joints elongate, subequal, apical two minute, subclavate, articulated outside near the apex of the 2nd joint; maxillary palpi 2-jointed, short, the basal joint shortest, the apical joint obtuse at the apex and setose; the labrum oblong, with the sides parallel. Thorax short, subglobose; the scutellum often projecting posteriorly and overhanging the median segment; legs moderately stout, the posterior tarsi (♀) flattened and clothed on the inner side with dense short pubescence; the tibiæ (especially the anterior pair)

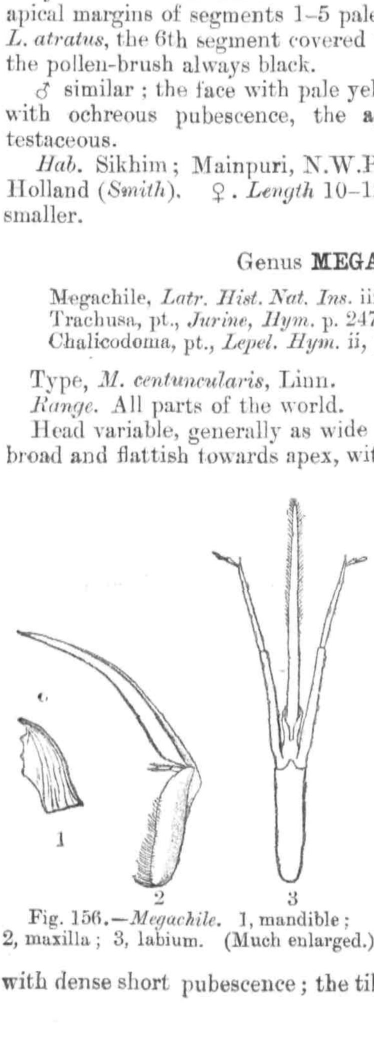


Fig. 156.—*Megachile.* 1, mandible; 2, maxilla; 3, labium. (Much enlarged.)

and the coxæ in the male variable, the latter generally dentate, the former and the basal joint of the anterior tarsi often flattened and produced or otherwise modified. Wings broad, ample; fore wing with the radial cell moderately broad, more or less rounded at apex; two cubital cells, subequal on the cubital nervure, the 2nd cell receiving the two recurrent nervures at base and apex respectively. *Abdomen* variable, subcordate, oblong or elongate, base concavo-truncate; ventral segments (♀) furnished with a more or less dense pollen-brush; apical segment (♂) notched, often dentate.

The species of *Megachile*, known as "leaf-cutter" bees from their habit of cutting out portions of leaves as lining for their nests, abound in India, many species coming into houses and stuffing up every available hole with clay and the material of their nests. The key-holes of boxes, of drawers in writing-tables, &c., are very favourite nesting-places. Many species dig into the ground, and line the tunnel thus made with neat round portions of leaves. All store pollen as food for their larvæ.

Key to the Species.

A. Abdomen black, with entirely black pubescence above.	
a. Wings dark fuscous.	
a'. Face with black pubescence	*M. anthracina* ♀, p. 473.
b'. Face with white pubescence........	*M. elizabethæ* ♀, p. 474.
c'. Face with golden pubescence	*M. carbonaria* ♂, p. 474.
b. Wings fusco- or flavo-hyaline.	
a'. Head and thorax in front with dense fulvous pubescence	*M. semivestita*, p. 474.
b'. Head and thorax with black pubescence.	
a^2. Clypeus produced and tuberculate in middle	*M. tuberculata*, p. 475.
b^2. Clypeus not tuberculate in middle.	
a^3. Clypeus emarginate anteriorly.	*M. atrata*, ~~p. 475~~.
b^3. Clypeus arched anteriorly	*M. heteroptera*, p. 475.
c. Wings hyaline, fuscous along apical margin	*M. anthracina* ♂, p. 473.
B. Abdomen with fulvous or ferruginous-red pubescence above.	
a. Clypeus emarginate anteriorly........	*M. ardens*, p. 475.
Clypeus arched anteriorly.	
a'. Head and thorax with black pubescence	
a^2. Abdomen cordate. Length 12–14 mm.	*M. bellula*, p. 476.
b^2. Abdomen elongate. Length 8–9 mm.	*M. stulta*, p. 476.
b'. Head and thorax with fulvous pubescence	*M. fulvovestita*, p. 477.
c. Clypeus transverse anteriorly.	
a'. Pollen-brush white	*M. bicolor*, p. 477.

b'. Pollen-brush golden-yellow.
  *a*². Length 17–20 mm. .... *M. fraterna*, p. 478.
  *b*². Length 11–14 mm. .... *M. quartinæ*, p. 478.
c'. Pollen-brush rich ferruginous red .. *M. mystacea*, p. 479.

C. Abdomen with basal segment clothed with snow-white, sometimes pale yellow long pubescence, rest of abdomen with sparse black pubescence.
a. Pollen-brush entirely bright fulvous .. *M. conjuncta*, p. 479.
b. Pollen-brush entirely jet-black........ *M. disjuncta*, p. 480.
c. Pollen-brush fulvous in middle, rest black *M. relata*, p. 480.

D. Abdomen with basal 1, 2, or 3 segments clothed with fulvous pubescence, rest with black.
a. Clypeus tuberculate in middle anteriorly. *M. monticola*, p. 480.
b. Clypeus not tuberculate anteriorly.
  a'. Head with black pubescence.
    *a*². Thorax with black or fuscous pubescence .... *M. badia*, p. 481.
    *b*². Thorax with fulvous pubescence .. *M. bhavanæ*, p. 481.
  b'. Head with fulvous pubescence.
    *a*². Antennæ and legs fulvous red .... *M. dimidiata*, p. 482.
    *b*². Antennæ and legs black.
      *a*³. Length 17–18 mm............ *M. velutina*, p. 482.
      *b*³. Length 12–13 mm............ *M. ceylonica*, p. 482.

E. Abdomen with basal one or two segments with fulvous pubescence, remainder ciliated or banded with same or with white pubescence.
a. Pubescence rich fulvous red.
  a'. Pollen-brush white.
    *a*². Wings flavo-hyaline, fuscescent along apical margin............ *M. lanata*, p. 483.
    *b*². Wings dark fuscous with a rich purple effulgence, base hyaline .. *M. umbripennis*, p. 483.
  b'. Pollen-brush pale fulvous.......... *M. amputata*, p. 484.
b. Pubescence pale fulvous.
  a'. Length 17 mm. .... *M. penetrata* ♀*, p. 484.
  b'. Length 12 mm. .... *M. buddhæ* ♂*, p. 484.
c. Pubescence bright yellow .... *M. vestita*, p. 485.

F. Abdomen with transverse bands on all segments above of white pubescence.
a. Pollen-brush white.
  a'. Punctures on disc of mesonotum coarse, running into transverse striæ.
    *a*². Head and thorax with white pubescence .... *M. cephalotes*, p. 485.
    *b*². Head and thorax with fulvous pubescence .... *M. faceta*, p. 486.
  b'. Punctures on disc running into striæ.
    *a*². Head and thorax with fulvous pubescence .... *M. griseopicta*, p. 486.

* Probably the two sexes of one species.

b^2. Head and thorax with white pubescence.	
a^3. Clypeus with a medial vertical carina.	*M. pulchripes*, p. 486.
b^3. Clypeus not carinate.	
a^4. Length 8–16 mm.	
a^5. Legs entirely black	*M. albifrons*, p. 487.
b^5. Legs more or less testaceous or orange-yellow.	
a^6. Pubescence pale yellow. .	*M. femorata*, p. 488.
b^6. Pubescence snow-white . .	*M. vigilans*, p. 488.
b^4. Length 6·5 mm.	*M. nana*, p. 487.
b. Pollen-brush bright fulvous or white at base, fulvous at apex.	
a'. Front above clypeus tuberculate	*M. hera*, p. 489.
b'. Front above clypeus not tuberculate. .	*M. chlorigaster*, p. 489.
G. Abdomen with segments 3–5 narrowly fringed or ciliated with ferruginous golden pubescence	*M. tricincta*, p. 489.
H. Abdomen with black pubescence above, one or two apical segments with pubescence of another colour.	
a. Apical margin of 5th and whole of 6th segment above with dense clay-coloured pubescence.	*M. moelleri*, p. 490.
b. Apical two segments bright testaceous brown.	*M. steloides*, p. 490.

827. **Megachile anthracina.** (Pl. III, fig. 11.)

Smith, Cat. i, p. 175, ♀.
Megachile fasciculata, *Smith, Cat.* i, p. 180, ♂.
Megachile hornei, *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897 (♂).

♀. Head and thorax very closely and finely punctured, the clypeus and front pubescent; abdomen smooth, the margins of the segments lightly depressed, with a few scattered fine punctures, the apical segment above pubescent; clypeus moderately convex, its anterior margin broadly arched; mandibles large, broad at apex and finely punctured. Jet-black, with black pubescence, somewhat sooty black and long on the median segment behind; the front above the ocelli, the cheeks, and the thorax above bare; the sides of the abdomen with a little black pubescence; the pollen-brush dense and black; wings dark fuscous with a purple effulgence.

Fig. 157. *Megachile anthracina*, ♂. 1/1.

♂ differs in being smaller, more finely and closely punctured; the pubescence on the clypeus, front, and thorax anteriorly is fulvous white, on the median segment and basal abdominal segment sooty black; the anterior and intermediate legs are rufo-testaceous on the inside, the tarsi of the latter fringed with fuscous hairs, forming a broad fan posteriorly; the apical segment slightly notched in the middle; wings hyaline, broadly fuscescent along their apical margins.

Hab. Throughout the North-West Provinces and Bengal, not ascending the hills to any height. ♀. *Length* 19–21; *exp.* 38–42 mm. ♂. *Length* 16–18; *exp.* 30–34 mm.

828. **Megachile elizabethæ,** n. sp.

♀. Head and thorax finely, closely, and regularly, abdomen more sparsely punctured and shining; clypeus broader than high, convex at base, anteriorly widely emarginate, the middle incised, with two slight projecting teeth; mandibles with a longitudinal groove running from the inside of the lower apical tooth, the inner flat broad portion at apex sparsely punctured; head not quite so wide as the thorax; abdomen ovato-conical, the margins of the segments depressed, the depressions medially much broader. Black; the sides of the face in front, the cheeks and thorax anteriorly with a soft longish white pubescence, turning to fusco-cinereous between the antennæ and on the median segment posteriorly; the base of the abdomen and the convex pygidium with a thin covering of fuscous hairs; the pollen-brush very dense, black, ferruginous red in the middle; legs with black pubescence; wings fuscous with a purple effulgence.

♂ similar, smaller; the pubescence on the clypeus and cheeks very dense, the base of the 1st segment with a square patch and broadly interrupted transverse bands at the apical margins of segments 2–6 of the abdomen of white pubescence; the bases of the 2nd and following segments strongly constricted, the apex of the 7th segment notched; wings hyaline at base.

Hab. Tenasserim. ♀. *Length* 16–18; *exp.* 34–39 mm. ♂. *Length* 14; *exp.* 29 mm.

*829. **Megachile carbonaria,** *Smith, Cat.* i, p. 179, ♂; *Dall. Torr. Cat.* x, p. 423.

" ♂. Length 5½ lines (=about 13 mm.). Black and shining, the abdomen having in some lights a purple metallic iridescence; th face below the insertion of the antennæ densely covered with bright golden pubescence; wings purple-black; sides of the meta-thorax covered with black pubescence; disc of the thorax and the abdomen above naked, the apical segment has its apex notched in the middle.

"*Hab.* Northern India (coll. W. W. Saunders, Esq.)."

830. **Megachile semivestita.**

Chalicodoma semivestita, *Smith, Cat.* i, p. 148, ♂.

♂. Head and thorax densely, the legs and abdomen sparsely pubescent; the tibiæ and basal joints of the tarsi of the legs and the abdomen finely and closely punctured, the individual hairs of the sparse pubescence springing from each puncture; mandibles rather coarsely longitudinally striate. Head and thorax covered with fulvous, the median segment broadly on the sides, the legs and abdomen with black pubescence; wings fusco-hyaline, darkening slightly along the costal margin of the fore wing.

Hab. India (*Smith*). ♂. *Length* 17; *exp.* 32 mm.

831. **Megachile tuberculata,** *Smith, Jour. Linn. Soc.* 1858, p. 46, ♀.
? Megachile longipalpis, *Radoszk. Wiadom. z nauk Przyrod.* pt. ii (1882), p. 78.

♀. Head, thorax, and abdomen densely but not coarsely punctured; head as wide as the thorax; mandibles long, curved, somewhat narrow, with a blunt tooth on the inner margin near the base and three apical teeth; clypeus short, broad, produced in the middle into a long prominent tubercle; the vertex behind the ocelli flattish, broad, with an abbreviated medial longitudinal carina. Black, with black pubescence; the median segment posteriorly and the basal segment of the abdomen with sooty-brown pubescence; the pollen-brush black; wings fulvo-hyaline, the apical margins light fuscous.

Hab. Tenasserim; Singapore; Borneo. ♀. *Length* 22–25; *exp.* 44–48 mm.

832. **Megachile atrata,** *Smith, Cat.* i, p. 182, ♀.
Megachile fulvipennis, *Smith, New Sp. Hym. B. M.* p. 68, ♀.

♀. Head in front somewhat coarsely and sparsely punctured, shining; the clypeus short, broad, longitudinally striate, anteriorly broadly emarginate, the emargination square; a medial vertical carina not quite reaching to the apex; thorax coarsely transversely rugose; abdomen moderately, finely, and densely punctured; segments 1–4 with a transverse narrow subapical groove above. Black, with jet-black pubescence; the pollen-brush black, in some specimens slightly reddish along the middle; wings fusco-hyaline or fulvo-hyaline, with a broad fuscous margin (the common form).

♂ similar, smaller; the apical segment carinate down the middle, the sides broadened and recurved, the apex incised; clypeus with a little dense white pubescence above and anteriorly.

Hab. Burma; Tenasserim; Nicobars; Philippines. ♀. *Length* 18–22; *exp.* 40–42 mm. ♂. *Length* 15; *exp.* 28 mm.

*833. **Megachile heteroptera,** *Sich. Novara-Reise, Hym.* p. 149; *Dall. Torr. Cat.* x, p. 433.

"♀ closely allied to and resembling *M. atrata*; differs in having the clypeus anteriorly rounded, not emarginate, and in the pollen-brush being reddish in the middle.

"♂ similar to the same sex in *M. atrata*, but the pubescence on the front and clypeus fulvous red, not white.

"*Hab.* Nicobars. ♀. *Length* 17–21; *wing* 11–13 mm. (*exp.* about 26–30 mm.). ♂ somewhat smaller."

834. **Megachile ardens,** *Smith, New Sp. Hym. B. M.* p. 67, ♀.

♀. Head, thorax, and abdomen pubescent; the head above the ocelli, cheeks, and clypeus bare, very finely and closely punctured, the anterior margin of the last emarginate, with the lateral angles of the emargination dentate and a +-shaped carina at the base. Black; the front above the antennæ with a little black pubescence;

the thorax covered with a thin fulvous pile, generally somewhat abraded on the disc of the mesonotum; legs with fuscous-black and the abdomen covered with dense rufo-fulvous pubescence above; the pollen-brush fulvous, the anterior tarsi throughout and the intermediate and posterior pairs on the inside with ferruginous pubescence; wings fusco-hyaline, darkening towards their apex.

Hab. Ceylon. ♀. *Length* 14; *exp.* 26 mm.

835. **Megachile bellula**, n. sp.

♀. Head and thorax sparsely, abdomen densely pubescent; the clypeus, vertex of the head, mesonotum, and scutellum above bare, finely and closely punctured; clypeus broad, convex, its anterior margin boldly arched; scutellum rounded posteriorly, not projecting over the postscutellum and median segment; abdomen subcordate, slightly depressed. Black; the pubescence fuscous black on the front and between the antennæ, and white on both sides of the face along the inner orbits, on the sides of the pronotum, of the scutellum, and of the median segment it is griseous, inside of the tarsi with ferruginous pubescence; abdomen covered with dense short fulvous-red pubescence above on segments 3–5, the basal two segments with transverse fasciæ of a lighter yellow, and the apical segment with a mixture of black and fulvous hairs; pollen-brush golden yellow; wings hyaline, lightly fuscous.

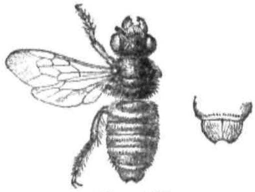


Fig. 158.
Megachile bellula, ♂. 3/2.

♂ similar, narrower in shape, the clypeus and front covered with a beautiful light golden, the scutellum at the sides and median segment posteriorly with thick long fuscous pubescence; abdomen entirely clothed with rufo-fulvous pubescence; the anterior tarsi testaceous; the apical segment notched.

Hab. Burma; Tenasserim; Sumatra. ♀. *Length* 12–14; *exp.* 22–24 mm. ♂. *Length* 12–13; *exp.* 24 mm.

836. **Megachile stulta**, n. sp.

♀. Head and thorax somewhat coarsely and very closely punctured, with a granular appearance; abdomen pubescent; clypeus convex, broader than high, anteriorly boldly arched; median segment slightly concave posteriorly and smooth; the bases of abdominal segments 1–5 narrowly bare and finely and closely punctured. Black; the clypeus and sides of the face, the pronotum, the sutures between the mesonotum, scutellum, postscutellum, and median segment, the sides of the last, and the legs above covered with a thin soft white down; the inside of the tarsi with a golden fulvous, and the abdomen with a ferruginous-red pubescence; the pollen-brush fulvous golden; wings fusco-hyaline.

♂ similar; the clypeus in front and at base, and the space round each antenna with white pubescence, the pubescence on the thorax fulvous and denser, on the abdomen more sparse than in the female, the apical two bands on the latter whitish; wings deep yellow at base, fusco-hyaline at apex.

Hab. Sikhim; Bangalore, Southern India (*Watson*). ♀. *Length* 9; *exp.* 16 mm. ♂. *Length* 8; *exp.* 16 mm.

837. **Megachile fulvovestita**, *Smith, Cat.* i, p. 176, ♀ ♂; *Dall. Tor. Cat.* x, p. 431.

♀. Head, thorax, and abdomen covered with dense pubescence above, the pubescence on the legs and beneath sparse, the surface under the pubescence closely and finely punctured; the clypeus widely arched anteriorly and with a medial vertical carina apparent under the pubescence; head flat, transverse, about as broad as the thorax. Black, the pubescence rich fulvous, pollen-brush white; wings subhyaline, slightly fuscous towards the apex.

♂ similar, smaller, the head broader in proportion and subquadrate; the anterior tarsi remarkably broad and flat, the basal three joints with broad flat internal lobes; the anterior coxæ have prominent conical tubercles anteriorly. Black; the pubescence a more golden fulvous than in the female; the anterior femora, tibiæ, and tarsi testaceous yellow.

Hab. Bombay. ♀. *Length* 15; *exp.* 27 mm. ♂. *Length* 13; *exp.* 24 mm.

838. **Megachile bicolor.**

Apis bicolor, *Fabr. Mant. Ins.* i, p. 304.
Apis albiventris, *Christ, Hym.* p. 171, pl. 13, fig. 9.
Megachile bicolor, *Lepel. Hym.* ii, p. 342; *Smith, Cat.* i, p. 181.

♀. Head, thorax, and abdomen finely punctured; clypeus subtriangular, slightly convex, anteriorly transverse, with a broad medial shallow sulcation not reaching its base; abdomen elongate, cordate. Black; the sides of the face and clypeus with rather thick white pubescence, a spot of the same underneath the base of the wings; the median segment and abdomen above with rich fulvous red, the posterior lateral angles of the former with white pubescence; legs black, the pubescence fuscous, fulvous red on the underside of the intermediate and posterior tarsi; pollen-brush white; wings fusco-hyaline.

♂ similar, smaller, head proportionately larger, wings lighter in colour; median segment and the intermediate and posterior tarsi beneath with golden yellow pubescence.

Hab. Rangit Valley, Sikhim; Agra; Allahabad; Bombay; Bangalore; Burma; China. ♀. *Length* 14–15; *exp.* 30 mm. ♂. *Length* 12; *exp.* 26 mm.

839. **Megachile fraterna***, *Smith, Cat.* i, p. 178, ♀.

♀. Head and thorax very densely and somewhat finely punctured, rugose; mandibles very broad at apex, rugosely striate, with four large strong teeth, and two small protuberances on the inner side; clypeus convex, semicircular, arched above, transverse below, and fringed with stiff bristly hairs; head as wide as the thorax or slightly wider; scutellum more coarsely punctured than the rest of the thorax. Head and thorax jet-black, with black pubescence on the front between the antennæ, along the sides of the mesonotum, and on the pleuræ and legs; on the median segment posteriorly the pubescence is fuscous, on the inside of the posterior tibiæ and tarsi fulvous; the tibial calcaria of the posterior legs ferruginous; abdomen clothed with dense fulvo-ferruginous pubescence; the pollen-brush golden yellow; wings flavo-hyaline at base, broadly fuscous at apex.

Fig. 159. *Megachile fraterna*, ♀. $\frac{1}{1}$.

Hab. India (*Smith*); Burma; Tenasserim (common). ♀. *Length* 17–20; *exp.* 28–32 mm.

840. **Megachile quartinæ**, *Gribodo, Ann. Mus. Civ. Gen.* (2ª) i, 1884, p. 352, ♀.

♀. Head, thorax, and abdomen closely and finely punctured, the punctures on the thorax above running into oblique anteriorly divergent fine striæ: clypeus semicircular, anteriorly truncate, the margin obscurely subdentate; abdomen with the apical margins of segments 1–5 broadly depressed, the depressions pubescent, punctured under the pubescence and anteriorly arched, the base of the segments smooth, impunctate. Black, a little black pubescence on both sides of the face; thorax and abdomen covered more or less densely with a rich short ferruginous-red pubescence, which is sparse on the disc of the mesonotum and forms transverse bands on the abdomen; legs nearly bare, the tarsi, especially on the inside, with a thickish covering of short ferruginous pubescence; pollen-brush pale golden yellow; wings bright fulvo-hyaline, broadly fuscescent along their apical margins.

Hab. Upper Burma; Tenasserim. ♀. *Length* 11–14; *exp.* 22–25 mm.

The specimens I procured in Tenasserim are darker than those from Upper Burma appear to be from the description.

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* *M. gribodei*, Radoszkowsky (Wiadom. z nauk Przyrod. pt. ii (1882), p. 80), from Sikhim, seems to me to be a smaller form of this species.

841. **Megachile mystacea***.

Apis mystacea, *Fabr. Syst. Ent.* p. 385 (Apis).
Megachile rufiventris, *Guér. Voy. Bélanger, Zool.* p. 502, *Atlas, Ins.* pl. 4, fig. 5; *Smith, Cat.* i, p. 178.
Megachile luculenta, *Bingh. Jour. Bomb. N. H. Soc.* 1890, p. 249, ♀.

♀. Head and thorax densely and rather coarsely punctured; clypeus triangular, depressed inwards, its anterior margin transverse, waved, and having in the middle two short teeth, and above near the base a +-shaped carina; mandibles large, powerful, longitudinally rugose. Black, the front between the antennæ with tufts of black pubescence; the sides of the pro- and mesonotum, the meso- and metapleuræ, scutellum, and median segment on both sides with erect fusco-griseous pubescence; legs black with fuscous pubescence, the inside of the posterior pair fulvous; abdomen covered with dense rich ferruginous-red pubescence, very often black on the 1st segment; pollen-brush ferruginous; wings dark fuscous to fusco-hyaline, in by far the commonest variety flavo-hyaline, fuscous along their apical margins.

♂ similar, smaller, with some white pubescence on the front of the head and clypeus. The calcaria in both sexes red.

Hab. India; Isle of France (*Smith*); Burma; Tenasserim, extending into the Malayan and Australian regions. ♀. *Length* 15–20; *exp.* 24–40 mm. ♂. *Length* 12–13; *exp.* 22 mm.

842. **Megachile conjuncta,** *Smith, Cat.* i, p. 175, ♀ ♂.

♀. Head, thorax, and abdomen very minutely and closely punctured; clypeus more sparsely punctured, with an impunctate space down the middle, its anterior margin transverse, the front between the antennæ and the base of the clypeus moderately convex, the latter anteriorly depressed, the occiput roundly emarginate; abdominal segments 1–5 with their apical margins very narrowly depressed, the anal segment large, the pygidium convex with a medial longitudinally-impressed line. Black, a little fuscous pubescence on the clypeus and apical segment of the abdomen, the depressed margins of segments 2–5 with transverse narrow bands of the same; the sides of the prothorax, the median segment, and the basal segment of the abdomen clothed with white, at the sides of the last sometimes with yellowish pubescence; pollen-brush bright fulvous; wings hyaline, broadly light fuscous towards their apex; legs castaneous brown, covered with glittering pale hairs, the tarsi of the intermediate and posterior legs with ferruginous pubescence.

♂ similar, smaller, with some white pubescence on the front and clypeus.

* Radoszkowski (Wiadom. z nauk Przyrod. pt. ii, p. 78) describes a species under the name *M. sikkimi* from Sikhim, which is either identical with the above or closely allied to it. *M. sikkimi* differs principally in having the pubescence on the thorax and basal segment of the abdomen entirely black.

Hab. Bengal (*Smith*); Sikhim; Burma; Tenasserim; Ceylon. ♀. *Length* 14–15; *exp.* 26–28 mm. ♂. *Length* 11; *exp.* 23 mm.

843. **Megachile disjuncta.**

Apis disjuncta, *Fabr. Ent. Syst.* ii, p. 328.
Megachile disjuncta, *Lepel. Hym.* ii, p. 331; *Smith, Cat.* i, p. 178.

♀. Head, thorax, and abdomen densely and somewhat coarsely punctured, the margins of abdominal segments 1–5 broadly depressed, the middle of the 4th just before the depressed portion always, and of the 2nd, 3rd, and 5th segments very often smooth, shining, impunctate; the clypeus from the front subtriangular, its apical margin transverse; mandibles broad at apex, the outer tooth acute; vertex broad, flattish, produced back; the back of the head roundly emarginate. Black; the face and front, the prothorax at the sides and beneath, and the legs on the outside with black pubescence; he pubescence on the inside of the tibiæ and tarsi fuscous; the median segment and the basal segment of the abdomen covered with thick long white to rusty-yellow pubescence; the pollen-brush jet-black; wings hyaline fuscous, for their apical three-fourths with a brilliant purple effulgence.

♂ similar, smaller; the base, sides, and apex of the clypeus with long white pubescence.

Hab. Throughout India, Burma, and Tenasserim; Isle of France (*Smith*). ♀. *Length* 16–17; *exp.* 30–32 mm. ♂. *Length* 12; *exp.* 24 mm.

844. **Megachile relata,** *Smith, New Sp. Hym. B. M.* p. 68, ♀.

♀. Closely allied to and resembling *M. disjuncta*, Fabr.; head about as wide as the thorax, but short, not so much produced behind on the occiput and cheeks as in that species; head, thorax, and abdomen more finely punctured, the margins of the segments of the last depressed, but as closely punctured as the base, not smooth; pubescence as in *M. disjuncta*, but the pollen-brush bright fulvous in the middle; the wings lighter in tint, clear hyaline at base, only slightly fuscescent towards their apical margins; legs castaneous brown, not black.

♂ smaller, exactly similar except the wings, which are fuscescent along their apical margins.

Hab. Burma; Tenasserim; China. ♀. *Length* 11–12; *exp.* 22–24 mm. ♂. *Length* 9; *exp.* 19 mm.

845. **Megachile monticola,** *Smith, Cat.* i, p. 179, ♀.

? Megachile rhinoceros, *Mocs. Termész. Füzetek.* xv, p. 131.
? Megachile felderi, *Radoszk. Wiadom. z nauk Przyrod.* pt. ii, 1882, p. 79, ♀.
Megachile samson, *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. In form, in shape of the head, the clypeus, and mandibles precisely like *M. tuberculata*; the head above more densely and coarsely, the abdomen more finely punctured, the margins of the

segments slightly depressed, the depressed border arched anteriorly; head, legs, and the 2nd and following abdominal segments jet-black, with black pubescence; the thorax and basal abdominal segment densely clothed with fulvous-red pubescence; wings hyaline, broadly fuscescent along their apical margins and yellowish at base; pollen brush black.

Fig. 160. *Megachile monticola*, ♀. ½.

♂ similar; abdomen narrower; head comparatively larger, the apical abdominal segment notched.

Hab. Sylhet; Assam; Burma; Tenasserim; North China. ♀. *Length* 26–27; *exp.* 44 mm. ♂. *Length* 23–25; *exp.* 44 mm.

846. **Megachile badia,** *Bingh. Jour. Bomb. N. H. Soc.* v, 1890, p. 248, ♀

♀. Head, thorax, and abdomen finely and closely punctured; head about as wide as the thorax; clypeus broader than long, with a T-shaped carina on its disc; mandibles broad, delicately longitudinally striate; abdomen with the base of the 2nd and 3rd segments slightly constricted. Black; face up to the anterior ocellus clothed with black pubescence; thorax with brownish-black, soft, rather long hair on the sides and on the median segment; legs black, claws of the tarsi and tibial calcaria castaneous; abdomen covered rather sparingly with black pubescence, the basal two segments with narrow submarginal bands of fulvous-red pubescence above; pollen-brush black; wings fulvo-hyaline, with a broad subfuscous margin.

♂ similar; the clypeus covered with dense white, the face between and below the bases of the antennæ with smoky-white pubescence; the pubescence on the thorax brownish black, with a tinge of pale fulvous; the base of the 2nd and 3rd abdominal segments more deeply constricted, the anal segment not incised at apex, but denticulate; wings somewhat lighter in colour than in the female *.

Hab. Pegu Hills, Burma; Tenasserim. ♀. *Length* 17–20; *exp.* 29–33 mm. ♂. *Length* 16; *exp.* 32 mm.

847. **Megachile bhavanæ,** n. sp.

♀. Head, thorax, and abdomen densely pubescent, and finely and closely punctured under the pubescence; clypeus slightly convex, subtriangular, the anterior margin slightly arched, nearly transverse; abdomen above depressed, somewhat flat. Black, with black pubescence; the thorax and basal two abdominal segments with rich fulvous pubescence, turning paler on the median segment;

* Radoszkowsky (Wiadom. z nauk Przyrod. pt. ii (1882), p. 79) has a *M. lichtensteini*, from Sikhim, which may be identical with the above, in which case his name would have priority; but I have failed to identify his species.

legs black, with black pubescence, no fulvous pubescence on the inside of the tarsi; the pollen-brush black, with the middle pale fulvous; wings flavo-hyaline, broadly fuscous along their apical margins.

Hab. Rangit Valley, Sikhim. ♀. *Length* 20; *exp.* 38 mm.

848. **Megachile dimidiata,** *Smith, Cat.* i, p. 174, ♀.

♀. Clypeus and front beneath the ocelli strongly and closely punctured; clypeus wedge-shaped, very slightly convex, its anterior margin arched, a prominent fine vertical carina from the middle of its base reaching nearly but not quite up to its anterior margin. Black, the clypeus and the space below the anterior ocellus nearly bare, remainder of the head and thorax and the basal segment of the abdomen densely covered with rich fulvous pubescence; the antennæ and legs pale fulvous; 2nd and following segments of the abdomen covered with short black pubescence above; the pollen-brush black; in the majority of specimens the 2nd abdominal segment is also thinly covered with fulvous pubescence; wings fulvo-hyaline, broadly fuscescent along their apical margins.

♂ similar, destitute of course of the pollen-brush, apex of anal abdominal segment bidentate.

Hab. India (*Smith*); Pegu Hills, Burma; Tenasserim. ♀. *Length* 13–14; *exp.* 28–30 mm.

849. **Megachile velutina,** *Smith, Cat.* i, p. 180, ♀.

♀. Closely allied to and resembling *M. dimidiata*: differs in having the clypeus more convex, shorter, posteriorly transverse, anteriorly less arched; the pubescence is a richer darker fulvous, and on the abdomen is invariably dense and thick on the basal two segments, the black pubescence on the remaining segments above is also more dense; the pollen-brush is fulvous along the middle, with the margins broadly black; and the antennæ and legs are black, not fulvous and, the latter covered with a thin fulvous pubescence.

♂ similar, with paler pubescence.

Hab. Northern India (*Smith*); Tenasserim. ♀. *Length* 17–18; *exp* 31–33 mm. ♂. *Length* 14; *exp.* 27 mm.

850. **Megachile ceylonica,** *Bingh. P. Z. S.* 1896, p. 453, ♂, pl. xv, fig. 9.

♀. Closely allied to and resembling *M. lanata*: differs in shape of the clypeus, which is shorter, broader, more strongly convex, and distinctly emarginate anteriorly, and in the abdomen being more cylindrical and very strongly convex above. Black; the front above the antennæ, the thorax, and basal three abdominal segments above covered with short dense fulvous-red pubescence; the clypeus, vertex of the head, the cheeks, and the legs with more sparse and shorter pile of the same colour; the sides of abdominal segments 4–6 and the 5th and 6th segments above also covered with moderately long black pubescence; pollen-brush thin and of

a pale fulvous-red colour; wings flavo-hyaline, with a broad fuscous apical border.

♂ similar, but the head larger and broader proportionately; the pubescence not so dense; it is white on the clypeus, face, thorax beneath, and legs, olivaceous on the thorax above and the margins of segments 1–4 above; wings darker than in the female.

Hab. Ceylon; Tenasserim. ♀. *Length* 12–13; *exp.* 22–23 mm. ♂. *Length* 11; *exp.* 18 mm.

851. **Megachile lanata.**

Apis lanata, *Fabr. Ent. Syst.* ii, p. 335.
Megachile lanata, *Lepel. Hym.* ii, p. 342: *Smith, Cat.* i, p. 177.
Megachile proxima, *Smith, Trans. Zool. Soc.* vii, p. 192, ♀ ♂.

♀. Head, thorax, and abdomen finely and closely punctured and pubescent: the clypeus sublunate in shape, anteriorly transverse. Black; the head, except the clypeus broadly in the middle, the thorax, and basal two abdominal segments above covered with dense, and the legs with thin fulvous-red pubescence; the apical margins of segments 3–5 above with narrow transverse fasciæ of white pubescence; pollen-brush white; antennæ and legs nigro-piceous; wings flavo-hyaline, the apical margin broadly fuscescent.

Var. The fulvous-red pubescence extending thinly on to the 3rd and 4th abdominal segments, and only the 5th segment with a white fascia, or with the fascia on the 3rd segment red in the middle, white laterally, the apical segment with white pubescence on both sides.

♂ similar, smaller, the pubescence on the clypeus and front paler, more golden in tint.

Hab. Throughout India, Burma, Tenasserim, and Ceylon. ♀. *Length* 14–15; *exp.* 26–28 mm. ♂. *Length* 12–13; *exp.* 22 mm.

852. **Megachile umbripennis.** (Pl. III, fig. 12.)

Smith, Cat. i, p. 175, ♀.

♀. Head, thorax, and abdomen closely punctured and pubescent; the disc of the clypeus, the vertex except round the ocelli, and the apical two-thirds of the 2nd and following abdominal segments bare; clypeus convex, transverse anteriorly; the margins of abdominal segments 1–5 narrowly depressed. Black; front, thorax, basal abdominal segment, and the base narrowly of the 2nd with dense fulvous pubescence; the 3rd segment with a narrow fringe of the same generally much obliterated, 4th and 5th segments with a narrow white lateral fascia; legs with black, the tarsi beneath of the posterior legs with fulvous pubescence; pollen-brush white with the apical portion black; wings hyaline at base, fuscous for the apical four-fifths of their length.

Hab. Nepal; Sikhim; Tenasserim. ♀. *Length* 13; *exp.* 27 mm.

♂ similar, smaller; the coxæ armed with short teeth; the apical abdominal segment notched in the middle.

Hab. Dehra Dun; Ahmedabad (*Miss A. Brook*). ♀. *Length* 11–14; *exp.* 20–26 mm. ♂. *Length* 9; *exp.* 19 mm.

858. **Megachile faceta,** n. sp.

♀. Head behind the ocelli, the cheeks, and thorax above densely and somewhat coarsely, and the abdomen more sparsely and finely punctured; the punctures on the head and thorax showing a tendency to run into longitudinal striæ; clypeus subtriangular, flat, its anterior margin transverse, waved; abdomen with broad, smooth, transverse depressed bands on the segments. Jet-black; the clypeus with short and thin, the front as high as the ocelli, and the sides of the pronotum with dense and rather long fulvous pubescence; the outer half of the tegulæ ferruginous; the median segment posteriorly, an abbreviated line on each side at the base of abdominal segments 2–5, and a transverse narrow line at the base of the 6th segment clothed with snow-white pubescence; pollen-brush white; wings hyaline at base, dark fuscous, having a purple effulgence from beyond the basal nervure.

Fig. 161.—*Megachile faceta*, ♀. $\frac{3}{2}$.

Hab. Burma: Tenasserim. ♀. *Length* 12–14; *exp.* 22–23 mm. Type in the British Museum.

859. **Megachile griseopicta,** *Radoszk. Wiadom. z nauk Przyrod.* pt. ii (1882), p. 80, ♀; *Dall. Torr. Cat.* x, p. 432.

♀. Head and thorax finely punctured, shining; clypeus conxex, triangular, its anterior margin arched. Black; the front of the head, a broad line on the occiput, and the sides of the pro- and mesonotum with fulvous pubescence; the median segment posteriorly, a spot at the base of the 1st abdominal segment, abbreviated narrow fasciæ on each side at the base of the 2nd, 3rd, 4th, and 5th, and an entire fascia across the base of the 6th segment covered with white pubescence; wings hyaline at base, fuscous, with a purple effulgence towards apex.

Var. The fasciæ at the base of abdominal segments 2–6 wanting.

Hab. Sikhim (*Radoszkowski*); Tenasserim. ♀. *Length* 12–14; *exp.* 24–28 mm.

I am not quite certain whether I have rightly identified this species.

860. **Megachile pulchripes,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head, thorax, and abdomen closely and coarsely punctured, the face in front on both sides of the antennæ, the sides of the thorax and median segment with short pubescence; clypeus transverse anteriorly, almost emarginate, subporrect; a narrow

medial carina up to the base of the antennæ, almost meeting a vertical short broad furrow running down from the anterior ocellus; scutellum large, prominent, overhanging the median segment, and with an obtuse tooth on the posterior lateral angles. Black; the anterior femora above and in front, the intermediate femora, and the posterior femora and tibiæ testaceous yellow; the pubescence on the head and thorax and narrow transverse apical pubescent bands on abdominal segments 1–5 white; pollen-brush snow-white; wings hyaline, nervures and tegulæ testaceous.

♂ similar, smaller; the tibiæ and tarsi of all the legs testaceous yellow; the basal four joints of the anterior tarsi flattened and lobed exteriorly.

Hab. Mussooree; Pegu Hills; Tenasserim. ♀. *Length* 6; *exp.* 12 mm. ♂. *Length* 5; *exp.* 11 mm.

861. **Megachile nana**, n. sp.

♀. Closely allied to *M. pulchripes*, and resembling it, but there is no antennal carina nor groove on the front; the scutellum is not prominent nor does it overhang the median segment, and the latter is rounded posteriorly; head orbicular, inner orbits slightly but distinctly convergent below; the face just above the base of the clypeus has a rounded transverse broad projection; the 2nd, 3rd, and 4th abdominal segments have a marked transverse groove near the base above. Black; the clypeus, sides of the face, the cheeks, sides of the thorax, the median segment, and transverse apical moderately broad fasciæ on abdominal segments 1–5 covered with snow-white pubescence; the fascia on the basal segment the narrowest, broadening laterally into a square patch of dense white pubescence; pollen-brush white; legs black with sparse white pubescence, fulvous on the inside of the posterior tarsi; wings hyaline and iridescent.

♂ similar, with a comparatively larger and broader head, covered with slightly fulvous pubescence in front; anterior coxæ dentate beneath; only the 2nd and 3rd abdominal segments with a transverse groove above; anal segment incised at apex and covered with dense snow-white pile.

Hab. Tenasserim. ♀. *Length* 7–8; *exp.* 15 mm. ♂. *Length* 6·5; *exp.* 14 mm.

862. **Megachile albifrons**, *Smith, Cat.* i, p. 180, ♀ ♂; *Dall. Torr. Cat.* x, p. 418.

♀. Head and thorax in front densely and closely, scutellum more coarsely, and abdomen somewhat sparsely and finely punctured; clypeus slightly convex, anteriorly rounded and hidden under thick pubescence; head large, slightly wider than the thorax; abdomen somewhat elongate, not cordate, the sides parallel, the apex broadly rounded, not acute, the margins of segments 2–4 above depressed. Black; the clypeus and front, the pronotum, sides of the thorax, sides of the median segment, a

broad lateral patch on the basal abdominal segment, and transverse fasciæ on the apical margins of segments 2–4 clothed with dense white pubescence; the fasciæ on the abdomen spreading from the margin of one segment narrowly on to the base of the succeeding segment; legs with fuscous black mixed with hoary pubescence, fulvous on the inside of the posterior tarsi; wings subhyaline, fuscous towards the apex.

♂ similar, smaller, with a white pubescent band also on the 5th segment of the abdomen.

Hab. North-West Provinces; Bombay. ♀. *Length* 16; *exp.* 30 mm. ♂. *Length* 11–12; *exp.* 22–23 mm.

863. **Megachile femorata,** *Smith, New Sp. Hym. B. M.* p. 68, ♀ ♂.

♀. Head, thorax, and abdomen finely and closely punctured and pubescent, the front and the tibiæ and tarsi of the legs densely so; clypeus slightly convex with a medial smooth longitudinal line, its anterior margin slightly arched, hidden by the dense pubescence; abdomen short, cordate. Black, the clypeus and cheeks with white pubescence; on the front of the head, the thorax, tibiæ and tarsi of the legs, and abdomen the pubescence is pale yellowish white, forming transverse bands on the apical margins of abdominal segments 1–5 above; legs with the anterior femora beneath and the intermediate and posterior femora brownish yellow; wings hyaline, sub-fuscescent along their apical margins.

♂ similar, smaller, with the legs in some specimens entirely brownish yellow, in others only the femora, as in the female, of that colour; anal abdominal segment incised at apex, with several teeth along the margin.

Hab. Bombay; Ahmedabad; Allahabad; Barrackpore. ♀. *Length* 8–9; *exp.* 16–19 mm. ♂. *Length* 7; *exp.* 15 mm.

864. **Megachile vigilans,** *Smith, 2nd Yark. Miss., Hym.* p. 5, ♀.
? Megachile albolineata, *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head a little coarsely, thorax and abdomen very finely and closely punctured; head about as wide as the thorax; eyes slightly convergent below; clypeus transverse, convex, anteriorly widely emarginate; 2nd, 3rd, and 4th abdominal segments with a medial narrow but deep transverse groove above. Black, the intermediate and posterior femora dull orange-yellow; the sides of the face, the pronotum and sides of the thorax, and narrow transverse fasciæ on the apical margins of abdominal segments 1–5 with snow-white pubescence, the fasciæ on the abdomen not following the margins of the segments in the middle but leaving a narrow border bare; pollen-brush white; the posterior tarsi on the inside with fulvous pubescence; wings hyaline, slightly fuscescent towards the apex.

♂ similar, the head proportionately broader and more square;

the legs entirely black; the pubescence on the clypeus and face dense and slightly fulvous.

Hab. Ladák; Sikhim; Ceylon; Tenasserim. ♀ ♂. *Length* 9–11; *exp.* 18–19 mm.

865. **Megachile hera**, n. sp.

♀. Head, thorax, and abdomen minutely and very closely punctured; head broader than the thorax, flat, the cheeks not much developed; clypeus very slightly convex, rounded anteriorly, and with a small tubercle above its base; abdomen cordiform. Black; the sides of the clypeus, the front above the antennæ, the sides of the thorax and the median segment with long soft white pubescence; the legs covered with short sparsely-set glittering white hairs; the base of the abdomen with long white pubescence, and the apical margins of segments 1–5 with a short white fringe of the same; pollen-brush white at base, fulvous on the apical four segments; wings hyaline and iridescent, nervures and tegulæ testaceous brown.

Hab. Tenasserim. ♂. *Length* 9; *exp.* 16 mm.

This pretty little species has somewhat the facies of a *Lithurgus*, but the mandibles are flat and quadridentate, and the abdomen shorter than in the species of that genus.

866. **Megachile chlorigaster,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head, thorax, and abdomen closely and rather finely punctured and pubescent: clypeus nearly circular, strongly convex; pronotum with its posterior margin transversely grooved, smooth and shining; the scutellum large, boldly arched posteriorly; median segment rounded at the sides, truncate at apex, the face of the truncation smooth, its upper margin, with the sides of the segment also above, coarsely rugose; abdomen with a subapical transverse groove along the margin of the 2nd segment above. Black, the pubescence snow-white; the pollen-brush dense and fulvous golden; wings hyaline, nervures dark brown; tegulæ black.

Hab. Mussooree. ♀. *Length* 7; *exp.* 15 mm. Type in coll. Rothney.

867. **Megachile tricincta,** n. sp.

♀. Head, thorax, and abdomen finely and closely punctured; head large, transverse, as wide as the thorax, eyes convergent below; clypeus convex, arched anteriorly; abdomen cordiform, depressed above, 2nd and 3rd segments with a transverse furrow above. Black; the clypeus and front, sides of the thorax and of the median segment with tufted white, the sides of the scutellum with fuscous pubescence; the tarsi of the legs and a fine narrow

fringe on the 3rd, 4th, and 5th abdominal segments above with glittering ferruginous golden hairs; pollen-brush golden yellow; wings hyaline, fuscescent along their apical margins.

Hab. Tenasserim. ♀. *Length* 9–10; *exp.* 17 mm.

868. **Megachile moelleri,** n. sp.

♀. Head and thorax densely and coarsely punctured, the punctures on the mesonotum and scutellum running into irregular waved, coarse, transverse striæ; clypeus subtriangular, coarsely reticulate, anteriorly transverse in the middle, oblique at the sides, the margin *slightly* recurved, the disc with a T-shaped carina; mesonotum raised, flat; a deep obliquely diverging smooth groove above the tegulæ on each side; the tegulæ and the median segment posteriorly smooth; abdomen with deep transverse grooves at the base of segments 2–5 above; basal segment very finely and closely punctured; segments 2–5 with their margins broadly depressed, densely and more coarsely punctured; the narrow basal portion between the groove and the depression on the 4th and 5th segments smooth; apical margin of the 5th and the whole of the 6th segment above densely pubescent. Black, a little fuscous pubescence between the antennæ and on the sides posteriorly of the median segment; the apical margin of the 5th and the whole of the 6th segment above with dense short clay-coloured pubescence; pollen-brush ferruginous red; wings hyaline, slightly fuscescent.

Hab. Rangit Valley, Sikhim, 1000 ft. ♀. *Length* 14–15; *exp.* 24 mm.

869. **Megachile steloides,** *Bingh. Jour. Bomb. N. H. Soc.* x, 1896, p. 198, pl. i, fig. 5, ♀.

♀. Head and abdomen finely and closely punctured, the margins of the segments of the latter narrowly smooth and shining; thorax more densely and less finely punctured, and having a granular appearance; clypeus anteriorly very slightly bisinuate, bluntly carinate down the middle; thorax with the scutellum strongly projecting backwards, the margin notched, overhanging the metathorax and median segment; abdomen broad, subcordate. Black and shining, the tibiæ and tarsi of the legs and the apical two abdominal segments bright testaceous brown; pollen-brush testaceous yellow, with a golden tint in certain lights; wings hyaline, darkening to light fuscous along the apical margins.

Hab. Rangit Valley, Sikhim. ♀. *Length* 13–14; *exp.* 28–30 mm.

Genus **ANTHIDIUM.**

Anthidium, *Fabr. Syst. Piez.* p. 364 (1804).

Type, *A. manicatum*, Fabr.

Range. Both hemispheres.

Head nearly as wide as the thorax; ocelli in a triangle on the

vertex; antennæ filiform, the scape subclavate, the basal joint of the flagellum subglobose; labial palpi 4-jointed, the 2nd joint longer than the 1st, the 3rd and 4th minute and articulated below the apex of the 2nd joint, both apical joints subclavate; maxillary palpi 2-jointed, basal joint short, cup-shaped. Thorax subglobose; scutellum produced back, overhanging the median segment, lunate, sometimes wedge-shaped with the posterior margin transverse; legs stout, the posterior tibiæ and tarsi sometimes dilated; wings moderately broad and ample, the radial cell in the fore wing long and narrow, the apex somewhat rounded, not closely approximate

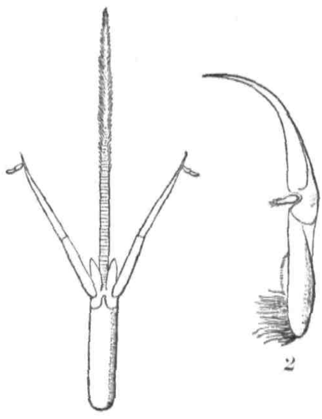

Fig. 162.—*Anthidium.* 1, labium; 2, maxilla. (Much enlarged.)

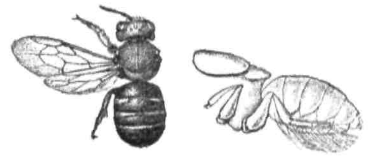

Fig. 163.—*Anthidium latipes*, ♀. $\frac{3}{1}$.

to the costal margin; two cubital cells, the 2nd receiving the 1st recurrent nervure near the base, the 2nd recurrent nervure interstitial with the 2nd transverse cubital nervure, or sometimes received beyond the apex of the 2nd cubital cell. Abdomen oblong, sometimes conical, the base truncate, the apex broadly rounded (♀) and furnished with a dense pollen-brush, in the male emarginate, dentate, and spined. The male, contrary to the general rule in hymenopterous insects, nearly always larger than the female.

Key to the Species.

A. Scutellum broad wedge-shaped, posterior margin transverse.
- *a.* Black, with white pubescent spots on abdominal segments........................ *A. lachrymosum*, [p. 492.
- *b.* Black, with yellow non-pubescent spots on abdominal segments.................... *A. flavomaculatum*, [p. 492.

B. Scutellum lunate, posterior margin rounded.
- *a.* Colours ferruginous and yellow............ *A. pulchellum*, [p. 493.

b. Colours black and yellow.
a'. Abdomen with a series of four yellow spots placed transversely across the segments.
*a*². Basal and apical segments with only two yellow spots .... *A. imitator*, p. 493.
*b*². Basal segment with four yellow spots.
*a*³. Apical segment with two yellow spots .... *A. ardens*, p. 494.
*b*³. Apical segment immaculate........ *A. ordinatum*, p. 494.
b'. Abdomen with transverse yellow fasciæ, more or less medially interrupted, or elongate lateral yellow spots.
*a*². Posterior tibiæ and tarsi broadly dilated .... *A. latipes*, p. 495.
*b*². Posterior tibiæ and tarsi not dilated.
*a*³. Head and thorax immaculate ...... *A. fraternum*, p. 495.
*b*³. Head and thorax variegated with yellow.
*a*⁴. Basal two abdominal segments with widely interrupted *broad* transverse yellow fasciæ; remaining segments with *broad* lateral yellow spots .... *A. orientale*, p. 495.
*b*⁴. All the abdominal segments with more or less narrowly interrupted *narrow* transverse yellow fasciæ.. *A. rasorium*, p. 496.

870. **Anthidium lachrymosum,** *Smith, New Sp. Hym. B. M.* p. 87, ♀ ♂; *Dall. Torr. Cat.* x, p. 463.

♀. Head and thorax closely, coarsely, and strongly, the base of the abdominal segments broadly, more finely, and lightly punctured; clypeus very slightly convex, transverse anteriorly; scutellum very broad, somewhat wedge-shaped, its posterior margin transverse; abdomen broadly conical. Black; the sides of the face, the cheeks, a spot on the mesonotum anteriorly, a patch under the wings, and lateral spots on abdominal segments 1–5 covered with dense, the legs with a thin white pubescence; fore wing dark fuscous, with a hyaline spot beyond the 2nd discoidal cell; hind wing hyaline.

♂ very similar; abdominal segments 3–5 with lateral teeth, the 6th segment with three apical teeth.

Hab. Malabar; Bombay; Tenasserim. ♀ ♂. *Length* 5–8; *exp.* 14–17 mm.

871. **Anthidium flavomaculatum,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head, thorax, and abdomen finely and closely punctured, the pronotum and the apical margins of the abdominal segments narrowly smooth and impunctate; the scutellum large, broad, transverse posteriorly. Black; the clypeus, sides of the face below the bases of the antennæ broadly, a large spot on the front, a broad line on the cheeks meeting on the vertex above, the

tubercles, the lateral and anterior margins of the mesonotum, widely interrupted on the latter, two diamond-shaped obliquely-placed spots occupying nearly the whole surface of the scutellum, the legs entirely (except the coxæ), and broad linear lateral markings on segments 1–5 of the abdomen yellow; wings hyaline, the fore wing shaded broadly at apex and along the costal and anal margins with fuscous; nervures dark brown, tegulæ yellow.

Hab. Poona. ♀. *Length* 5; *exp.* 11 mm. Type in coll. Rothney.

872. **Anthidium pulchellum,** *Klug, Symb. Phys.* dec. 3, pl. xxviii, fig. 11, ♀; *Dall. Torr. Cat.* x, p. 468.

♂. Head, thorax, and abdomen somewhat coarsely punctured, giving them a granular appearance, the apical margins of abdominal segments 1–5 smooth and shining; scutellum convex, its anterior margin rounded and fringed with pubescence, rounded posteriorly, slightly incised or emarginate in the middle; abdomen broad, strongly curved, very convex above; anal segment very broad, nearly transverse posteriorly, the margin slightly recurved, a short carina down the middle ending in a rounded short tooth. Ferruginous; the clypeus, a broad stripe on the cheeks, continued along the occiput, a narrow stripe on each side of the mesonotum anteriorly, bent and passing by the tegulæ, a broad stripe on the posterior margin of the scutellum, and the legs pale yellow; the antennæ in front fulvous, the space between them and the clypeus with sparse white pubescence; the legs with pale glittering pubescence, turning to golden on the inside of the posterior tibiæ and tarsi; wings fusco-hyaline, nervures dark brown, tegulæ yellow with a ferruginous spot in the middle.

Hab. Bombay (*Wroughton*); Egypt; Nubia; Arabia. ♂. *Length* 9; *exp.* 17 mm.

873. **Anthidium imitator,** *Smith, New Sp. Hym. B. M.* p. 85, ♂; *Dall. Torr. Cat.* x, p. 462.

♂. Head and thorax finely and closely punctured, opaque; abdomen shining, the surface lightly but very minutely and densely punctured; clypeus very slightly convex, transverse anteriorly; abdomen somewhat elongate, strongly convex above; apical segment trifurcate at extreme apex and with a small lateral tooth. Black; the clypeus and front, the pronotum anteriorly, the sides of the thorax and of the median segment with long pale fulvous pubescence; the tibiæ and tarsi of the legs with more sparse and brighter pubescence; the clypeus and front below the base of the antennæ, the scape of the antennæ in front, a minute spot above the eyes, the tibiæ and tarsi above, a spot on each side of the basal abdominal segment, two spots (one lateral, one more towards the middle) joined by a narrow line on each side of segments 2–5, and a square spot on each side of the middle of the 6th segment, yellow; wings subhyaline.

Hab. Punjab. ♂. *Length* 13–15; *exp.* 26 mm.

874. **Anthidium ardens**, *Smith, New Sp. Hym. B. M.* p. 85, ♀; *Dall. Torr. Cat.* x, p. 456.

♀. Head, thorax, and abdomen closely and finely punctured; clypeus slightly convex, the apical margin arched; scutellum sublunate, the middle incised posteriorly; abdomen short, convex, Black: the face on each side as high as the base of the antennæ, the base of the mandibles, four minute spots on the posterior margin of the vertex, a transverse abbreviated line on each side of the mesonotum anteriorly, another over the tegulæ, the posterior margin of the scutellum, two longitudinal spots on the disc of the mesonotum, a series of four spots in a transverse line across each of abdominal segments 1–5, and two spots medially side by side on the 6th segment, yellow; the inner two spots on the basal segment are minute, and on the 4th and 5th segments are joined to the outer spots by narrow yellow lines; legs with the tarsi pale yellowish; the clypeus sparsely, the front of the head, sides of the thorax, and legs with white pubescence; pollen-brush pale and glittering; wings subhyaline, apical and costal margins of fore wing fuscescent.

Hab. Western India. ♀. *Length* 9; *exp.* 19 mm. ♂ unknown.

875. **Anthidium ordinatum.** (Pl. III, fig. 13.)
Smith, New Sp. Hym. B. M. p. 86, ♀ ♂; *Dall. Torr. Cat.* x, p. 467.

♀. Head and thorax finely and very densely punctured, opaque; abdomen shining, minutely punctured, the apical margins of the segments slightly depressed; clypeus transverse anteriorly; scutellum sublunate, slightly convex, rounded posteriorly. Black; the base of the mandibles, the sides of the clypeus and face, the outer margins sometimes of the mesonotum anteriorly and on the sides, and of the scutellum posteriorly, and a series of four spots placed transversely across abdominal segments 1–4, pale yellow; the thorax above clothed with fulvous brown; the sides of the thorax, the legs, and sides of the abdomen with white pubescence; the pollen-brush white; the inner spots on the abdominal segments pear-shaped and placed obliquely; wings hyaline, fuscous along the costal and towards the apical margins.

♂ similar; the clypeus and face up to the base of the antennæ, an interrupted line on the posterior margin of the vertex, the outer margin of the tegulæ, the lateral angles and posterior margin medially of the scutellum, a line on the anterior and intermediate tibiæ above, a spot at the base of each posterior tibia, four contiguous spots on the 5th abdominal segment and two on the 6th, yellow; the 6th segment furnished laterally with a spine, the 7th segment emarginate at apex and with three spines; the inner spots on the 5th and 6th segments joined to the outer spots by a narrow line.

Hab. Poona; Bombay; Karáchi. ♀. *Length* 10–13; *exp.* 20–22 mm. ♂. *Length* 14–15; *exp.* 26 mm.

876. **Anthidium latipes,** n. sp.

♀. Head and thorax somewhat coarsely and very closely and strongly punctured, giving them an opaque granular look; abdomen shining, more lightly and sparsely punctured; clypeus much broader than high, anteriorly arched and margined; scutellum lunate, slightly convex, and notched posteriorly in the middle. *Black*; a spot at the base of the mandibles, the clypeus except its anterior margin narrowly, and two spots at its base, the face on each side below the base of the antennæ, a line on the cheeks, a line above the tegulæ, a medially interrupted short line on the posterior margin of the scutellum, a square spot on each side of the 1st abdominal segment, an elongate spot on each side of the 2nd, a broadly interrupted transverse fascia across the 3rd and 4th, an entire transverse fascia on the 5th, and the whole of the 6th segment above, bright yellow; legs black, variegated with yellow and ferruginous: the posterior tibiæ and basal joints of the tarsi flattened and covered with glittering golden hairs; pollen-brush golden: wings hyaline, faintly fuscescent along the costal margin of the fore wing; nervures testaceous, tegulæ black narrowly edged with yellow.

Hab. Rangoon, Burma. ♀. *Length* 9; *exp.* 17 mm.

877. **Anthidium fraternum,** n. sp.

♀. Allied to and resembling *A. latipes*: differs in the posterior tibiæ and basal joint of the tarsi not being dilated and flat; the head and thorax more densely punctured and granular; the abdomen by contrast much more finely punctured and shining; scutellum rounded posteriorly. Black; the head, thorax, legs, and basal abdominal segment immaculate; an elongate lateral spot on the 2nd, a transverse band broadly interrupted in the middle on the 3rd, another transverse band narrowly interrupted on the 4th, an entire transverse band on the 5th, and the whole of the 6th segment above, yellow; head in front, the thorax, and legs sparsely covered with silvery pubescence; pollen-brush white; wings light fusco-hyaline, darker along the costal margin of the fore wing.

Hab. Tenasserim. ♀. *Length* 9; *exp.* 17 mm. Type in the British Museum.

878. **Anthidium orientale,** n. sp.

♀. Head, thorax, and abdomen finely and very densely punctured, slightly shining; clypeus anteriorly transverse, fringed with somewhat stiff pubescence; scutellum rounded posteriorly: abdomen slightly curved, strongly convex above. Black; the base of the mandibles, the clypeus, the face on each side of it, a narrow stripe broadening above along the inner orbits almost to the top of the eyes, a spot below the anterior ocellus, a broad stripe on each cheek, nearly meeting on the posterior margin of the vertex, a stripe on each side of the mesonotum anteriorly, bent almost at a right angle and passing by the tegulæ, a spot on the tegulæ in front, a broad stripe on the posterior margin of the scutellum,

interrupted in the middle, the apex of the femora beneath, the tibiæ above (in the fore legs the tarsi above also), and broad transverse lateral spots on abdominal segments 1–5, bright yellow; the head, thorax, and abdomen with a sparse glittering pale pubescence; the pollen-brush white; wings hyaline, fuscous along the costal margin.

Hab. Tenasserim. ♀. *Length* 8; *exp.* 16 mm. ♂ unknown.

879. **Anthidium rasorium,** *Smith, Trans. Ent. Soc.* 1875, p. 50, ♀ ♂; *Dall. Torr. Cat.* x, p. 469.
Anthidium rufipes, *Smith* (*nec Fabr.*), *New Sp. Hym. B. M.* p. 85.

♀. Head, thorax, and abdomen finely and closely punctured; clypeus slightly convex, anteriorly rounded, and densely pubescent; scutellum broadly lunate, almost subtriangular, notched in the middle posteriorly; abdomen convex, strongly curved. Black, covered all over with a soft white down, the clypeus and front with dense white pubescence; the legs and abdomen beneath ferruginous; the clypeus, face as high as the base of the antennæ, a spot on the mandibles, and a line on the cheeks continued along the margin of the vertex, white; a line on each side of the mesonotum near the tegulæ, joining a line along the posterior margin of the scutellum, and a fascia across the middle of each segment yellow, the fascia on the 1st segment reduced to a lateral spot, on the 2nd widely, on the others narrowly interrupted in the middle; basal joint of posterior tarsi white; wings hyaline and iridescent.

♂ similar, but the markings all paler, those on the abdomen forming an entire transverse band on the 1st, narrowly interrupted bands on the 2nd–5th segments, and a lunate spot in the middle of the 6th segment; the 7th segment very broad, transverse apically and tridentate.

Hab. Bengal; Central Provinces; Bombay; Bangalore; Burma; Tenasserim. ♀. *Length* 7; *exp.* 13 mm. ♂. *Length* 8; *exp.* 14 mm.

Genus STELIS.

Stelis, *Panz. Krit. Revis. Faun. Deutschl.* ii, p. 246 (1806).

Type, *S. aterrima*, Panz.

Range. Both hemispheres.

Head convex anteriorly, transverse posteriorly, cheeks moderately well developed; ocelli in a triangle on vertex; antennæ filiform, geniculated; labial palpi 4-jointed, basal two joints the longest, the 1st about two-thirds the length of the 2nd, the 3rd and 4th minute; maxillary palpi 2-jointed, both joints minute. Thorax subglobose, the scutellum more or less produced backwards; fore wing with the radial cell at apex not approximate to the costal margin; two cubital cells, subequal

Fig. 164.—*Stelis cornuta*, ♀. $\frac{3}{1}$.

on the cubital nervure, the 2nd cell receiving the 1st recurrent nervure near the base, the 2nd recurrent nervure joining the cubital nervure beyond the apex of the cell; legs slight, without pubescence. Abdomen broad, very convex above, strongly curved downwards; the female not provided with a pollen-brush.

Stelis is parasitic on *Osmia* in Europe. Nothing is known of the habits of the two Indian species. One of these, *S. cornuta*, I have placed in the genus *Stelis* with much doubt. In the shape of its head and, above all, in the remarkable horned mandibles it differs considerably from typical forms of that genus.

Key to the Species.

a. Mandibles normal, not produced at base...... *S. parvula*, p. 497.
b. Mandibles at base produced into a prominent triangular tooth .... *S. cornuta*, p. 497.

880. **Stelis parvula**, *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♂. Head, thorax, and abdomen closely and coarsely punctured, somewhat thickly pubescent, the pubescence longer and most dense on the head in front and the sides and front of the pronotum; mesonotum with an obscure median longitudinal furrow; abdomen longer than the head and thorax, strongly convex above. Black; the pubescence hoary, snow-white on the clypeus and face in front; the posterior lateral angles of the scutellum, a spot at the base of all the tibiæ, a broad border to the tegulæ, a more or less lengthened spot on each side of all the segments of the abdomen, with a second similar inner spot on the 3rd, 4th, and 5th segments, dull whitish yellow; antennæ fulvous brown beneath; wings hyaline, nervures testaceous.

Hab. Barrackpore. ♂. *Length* 4; *exp.* 8 mm. Type in coll. Rothney.

A true *Stelis*, the abdomen not toothed at apex, with the markings of *Anthidium*.

881. **Stelis cornuta**, n. sp.

♀. Head and thorax finely and very closely, abdomen more minutely and densely punctured; clypeus much broader than high, transverse, its anterior margin straightly truncate, with a square emargination in the middle; mandibles very long, massive, the base with a recurved projecting strong triangular tooth; the apex of the mandible minutely tridentate. Black; the mandibles on the outside except at base and apex, the clypeus broadly along the apical margin, an elongate mark between and a little above the base of the antennæ, a broad stripe along the inner orbits reaching very nearly to the top of the eyes, another broad stripe on each cheek continued along the posterior margin of the vertex, a snake-like mark forming a double loop on the mesonotum, the scutellum, an abbreviated stripe on the anterior and intermediate femora behind and on the posterior femora in front, and transverse

stripes across the middle of the abdominal segments, yellow; the antennæ, the legs, and the black portions of the abdomen more or less piceous; the scape of the antennæ in front fulvous; wings hyaline, bright fulvous along the costal margin.

Hab. Rangoon, Burma. ♀. *Length* 10; *exp.* 22 mm. The type and only specimen as yet known is in the British Museum.

Genus PAREVASPIS.

Parevaspis, *Ritsema, Tijd. v. Ent.* xvii, p. lxxi (1874).

Type, *P. abdominalis*, Smith.

Range. Indo-Malayan region.

Head transverse, as broad as the thorax; ocelli in a broad curve on the vertex; inner orbits of eyes parallel; clypeus convex, broad; mandibles broad, armed with three teeth; antennæ filiform; labial palpi 4-jointed, the basal joint more than twice the length of the 2nd joint, apical two joints minute, articulated to

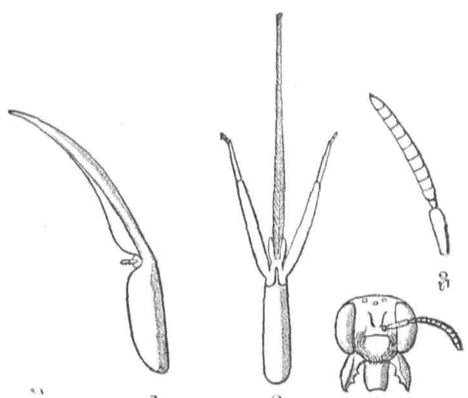

Fig. 165.—*Parevaspis.*
1, Maxilla; 2, labium; 3, antenna; 4, face from front. (Much enlarged.)

the side of the apex of the 2nd joint; maxillary palpi 2-jointed, both joints minute; scutellum broad, flat, horizontal, deeply incised at apex, the sides rounded; legs short, slight, without dense pubescence or scopa. Fore wings with the radial cell subacute at apex; two cubital cells, the 2nd cubital cell receiving the 1st recurrent nervure near the base, the 2nd recurrent nervure terminating beyond the apex of the cell. Abdomen broad, subovate, convex above, subconcave beneath; the apical segments curved downwards; the anal segment (♀) rounded and slightly incised in the middle posteriorly, (♂) tridentate posteriorly.

This genus is very close to *Stelis*, but the mouth-parts are different, and the male anal segment in the latter is rounded, not

tridentate. *Parevaspis* is parasitic on the leafcutter bees (*Megachile*). I have seen *P. abdominalis* entering the nest of *M. disjuncta*.

Key to the Species.

a. Abdomen red	*P. abdominalis*, p. 499.
b. Abdomen black	*P. carbonaria*, p. 499.

882. **Parevaspis abdominalis.**

Stelis abdominalis, *Smith, Jour. Linn. Soc.* 1859, p. 79, ♂.
Parevaspis abdominalis, *Dall. Torr. Cat.* x, p. 480.

♀. Head, thorax, and abdomen closely, evenly, and somewhat coarsely punctured; clypeus boldly convex, crossed near the base by a transverse short carina at right angles to a carina between the bases of the antennæ: a short, slightly oblique carina runs also from the base of each antenna up the front; the apical margins of the abdominal segments narrowly smooth, impunctate. Head and thorax black; abdomen ferruginous red; the sides and apex of the clypeus, the sides of the face and the occiput with white pubescence; wings fuscous, with a rich purple effulgence, hyaline towards the base.

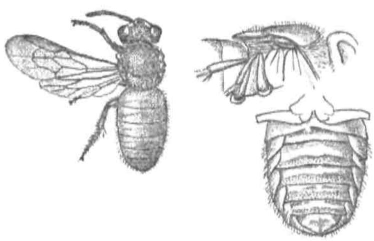

Fig. 166.—*Parevaspis abdominalis*, ♀. $\frac{3}{2}$.

♂ similar, somewhat more finely punctured on the head, mesonotum, and abdomen.

Hab. Burma; Tenasserim; the Malayan region to Celebes; Japan? ♀. *Length* 9–15; *exp.* 18–28 mm. ♂. *Length* 9–10; *exp.* 19–21 mm.

883. **Parevaspis carbonaria.**

Stelis carbonaria, *Smith, Cat.* ii, p. 275.
Parevaspis carbonaria, *Dall. Torr. Cat.* x, p. 480.

♀ ♂. Closely resembling and allied to *P. abdominalis*; not so coarsely punctured, the front and space between the bases of the antennæ slightly raised, with a medial carina beneath running on to the base of the clypeus. The entire head, thorax, and abdomen black.

Hab. Bombay; Ahmedabad; the Punjab; Allahabad; Rangoon; Mandalay; Ceylon. ♀ ♂. *Length* 8–12; *exp.* 18–25 mm.

Genus **CERATINA**.

Ceratina, *Latr. Hist. Nat. Ins.* xiv, p. 50 (1805).

Type, *C. albilabris*, Fabr.

Range. Both hemispheres.

Head transverse; front flat or with sulcations round the base

of the antennæ; ocelli in a triangle on the vertex; antennæ short, subclavate; mandibles stout, tridentate; labial palpi 4-jointed, basal two joints elongate, apical two minute; maxillary palpi 6-jointed, basal three joints subequal, apical three gradually decreasing in length. Thorax ovate; fore wing with the radial cell rounded at apex, the apex not approximate to the costal margin; three cubital cells, the 2nd forming a truncated triangle, the 2nd and 3rd cells each receiving a recurrent nervure beyond the middle; legs short, fairly stout, destitute of polliniferous appendages. Abdomen slightly narrowed at base.

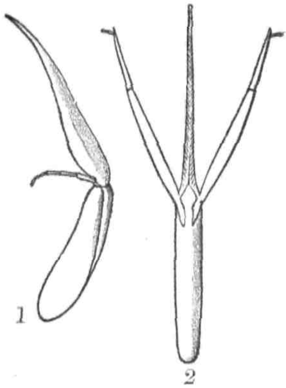

Fig. 167.—*Ceratina*.
1. Maxilla; 2. labium. (Much enlarged.)

Of the Indian species I have only observed the nests of *C. perforatrix*, made in the hollow of a dead shoot of the branching bamboo (*Pseudostachyum compactiflorum*, Kurz), and of *C. viridissima*, Dall. Torr., tunnelled into the dead stems of the common castor-oil plant.

Key to the Species.

A. Metallic green, bluish or bronzed green, with a few yellow markings.
  a. Abdomen entirely green.
    a'. Length 8–10 mm. .... *C. viridissima*, p. 501.
    b'. Length 4–5 mm. .... *C. propinqua*, p. 501.
  b. Abdomen green, segments 4–6 with square velvety-black lateral spots .... *C. sexmaculata*, p. 501.
  c. Abdomen green, banded with yellow .... *C. taprobanæ*, p. 502.
B. Head and thorax black, abdomen entirely ferruginous red .... *C. picta*, p. 502.
C. Black, variegated with yellow.
  a. A ⊥-shaped yellow macula on clypeus.
    a'. Basal three abdominal segments immaculate .... *C. perforatrix*, p. 502.
    b'. Abdominal segments 1–5 with a yellow transverse band .... *C. hieroglyphica*, p. 503.
  b. Clypeus entirely yellow.
    a'. Apical three abdominal segments black, immaculate .... *C. moderata*, p. 504.
    b'. Abdominal segments 1–5 with broad entire transverse yellow bands ...... *C. beata*, p. 504.
  c. Clypeus with a transverse yellow line slightly broadened in the middle.
    a'. Space at base of median segment with wide reticulations .... *C. lepida*, p. 505.
    b'. Space at base of median segment minutely punctured .... *C. simillima*, p. 505.

884. **Ceratina viridissima.**

Ceratina viridis, *Guer.* (*nec Latr.*) *Icon. Règn. Anim., Ins.* p. 449, pl. 73, fig. 6; *Smith, Cat.* ii, p. 224.
Ceratina viridissima, *Dall. Torr. Cat.* x, p. 201.

♀ ♂. Head, thorax, and abdomen finely and closely punctured, granular; clypeus elongate triangular, margined all round, and with a medial longitudinal carina; mesonotum convex, with two medial parallel impressed lines, and an abbreviated impressed line on each side of and parallel to them; abdomen with segments 1–5 marked with a short obscure impressed line on each side above, just before the apical margin. Bright green, sometimes blue, metallic and shining; clypeus and a line on all the tibiæ above yellow; mandibles, labrum, antennæ, legs, and the impressed lines on the thorax and abdomen black, the legs sometimes with a greenish or bluish tint and covered with hoary white pubescence; wings hyaline and iridescent, nervures and tegulæ testaceous brown.

Hab. Apparently throughout India, Burma, and Ceylon; Assam; China; Malacca. The specimens from the Punjab and Western India have a golden-bronzy tint; those from Ceylon and Burma are darker. ♀ ♂. *Length* 8–10; *exp.* 16–17 mm.

885. **Ceratina propinqua,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head coarsely punctured; the front above the clypeus and round the base of the antennæ hollow; the carina thus formed between the lateral hollows forked below the anterior ocellus, the lateral branches running to the posterior ocelli; mesonotum, scutellum, postscutellum, and median segment minutely and closely punctured; median segment very short, with a very steep slope posteriorly, the enclosed rugose space at base very small; abdomen closely punctured, the basal two segments minutely punctate, the remainder with gradually coarser punctures towards the apex, the apical three segments thinly pubescent. Dark bluish green; an elongate pyramidal spot on the clypeus, the tubercles, and a stripe on the tibiæ above yellowish white; antennæ, mandibles, and legs piceous; tarsi testaceous; wings hyaline, nervures and tegulæ testaceous.

Hab. Mussooree, Northern India. ♀. *Length* 4–5; *exp.* 8 mm.

Fig. 168.—*Ceratina sexmaculata*, ♀. $\frac{3}{1}$.

886. **Ceratina sexmaculata,** *Smith, New Sp. Hym. B. M.* p. 92, ♂; *Dall. Torr. Cat.* x, p. 200.

♀. Head, thorax, and abdomen closely punctured, with a granular appearance; clypeus impunctate, faintly vertically carinate; median segment very short, not more than 2 mm. in length, vertically truncate posteriorly, the edge of the truncation above margined. Bright emerald-green, the clypeus yellow; the antennæ and legs chestnut-brown, the last variegated with yellow; abdominal

segments 4–6 with a square velvety black spot on each side of the middle above, the spots decreasing in size posteriorly; wings hyaline with a faint yellow tint, nervures and tegulæ testaceous.

♂ similar; the apical margin of the 6th segment crenulate and subdentate in the middle, the 7th with a longer acute tooth medially.

Hab. Hong Kong; Upper Burma; Tenasserim; extending to Celebes. ♀ ♂. *Length* 7–8; *exp.* 12 mm.

887. **Ceratina taprobanæ,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head and thorax very minutely and closely punctured; median segment on the sides and at apex very finely striolate, the enclosed space at base rugose; the scutellum and postscutellum fringed with long hairs; the head and abdomen thinly pubescent. Green and shining; the clypeus, labrum, and palpi yellow; the clypeus with two black lines; the scape of the antennæ above and below, the flagellum beneath, a line on the pronotum, and the tubercles yellow; the legs variegated and the abdomen banded with yellow; scutellum dark purple; wings hyaline, nervures and tegulæ pale testaceous.

Hab. Ceylon. ♀. *Length* 3–4; *exp.* about 6 mm. Type in coll. Rothney.

888. **Ceratina picta,** *Smith, Cat.* ii, p. 224, ♀; *Dall. Torr. Cat.* x, p. 199.

♀. Head with a few scattered punctures; mesonotum anteriorly and posteriorly closely and finely punctured, smooth, polished, and shining in the middle; abdomen finely punctured, the punctures more dense on the apical three segments, the margins of segments 2–5 narrowly depressed; clypeus flat, transverse anteriorly; median segment rounded and steep posteriorly, the space at base above flat or slightly depressed, with a medial somewhat obscure longitudinal carina, which runs to the apex of the segment. Head, thorax, and legs jet-black, shining; the labrum and base of the mandibles, a line along the apical margin of the clypeus, two very short vertical lines running up from it medially, a line along the inner orbits broadening below, a broader line along the outer orbits, two oblique spots below the anterior ocellus, a transverse line on the pronotum, two medial longitudinal parallel lines on the disc of the mesonotum, and two sublunate contiguous spots on the scutellum yellow; the legs black, the tibiæ above and the tarsi obscurely rufo-testaceous; abdomen entirely ferruginous; wings fusco-hyaline and iridescent.

Hab. Ceylon (*Smith*). ♀. *Length* 7; *exp.* 14 mm.

889. **Ceratina perforatrix,** *Smith, New Sp. Hym. B. M.* p. 92, ♂.

♀. Head and face and mesonotum anteriorly sparingly punctured; abdomen somewhat more closely and very finely punctured; head, thorax, and abdomen polished and shining; median segment

steeply sloped, rounded posteriorly, with a medially impressed longitudinal line; the bases of the 2nd and 3rd abdominal segments deeply constricted, their apical margins depressed. Black; a broad ⊥-shaped mark on the clypeus, a squarish spot on each side of it, a spot on the labrum, a line on the cheeks, a transverse fascia on the apical margin of the 4th abdominal segment, broadening slightly in the middle, and another on the 5th, broadening considerably in the middle, yellow; the legs black with sparse black hairs, the underside of the tarsi with dense golden pubescence; the wings fusco-hyaline.

Fig. 169.—*Ceratina perforatrix*, ♀. $\frac{2}{1}$.

♂. Differs in the yellow markings on the face being broader; the 4th and 5th abdominal segments have a yellow fascia on the apical margins, those on the 4th being interrupted in the middle, the 6th with a medial yellow spot; the legs rufo-piceous, not black.

Hab. Assam; Pegu Hills; Tenasserim. ♀. *Length* 12; *exp.* 22 mm. ♂. *Length* 10; *exp.* 20 mm.

890. **Ceratina hieroglyphica.** (Pl. IV, fig. 3.)

Smith, Cat. ii, p. 226, ♀ ♂; *Dall. Torr. Cat.* x, p. 199.

? Ceratina flavopicta, *Morawitz* (*nec Smith*), *Hor. Soc. Ent. Ross.* xxiv (1890), p. 356.

? Ceratina morawitzii, *Stadelm. Zoolog. Jahrb., Syst.* viii (1894) p. 233.

♀. Head above and the hollow on the front below the ocelli somewhat coarsely, the thorax and abdomen more finely punctured, the punctures on the abdomen emitting short decumbent hairs; the clypeus, disc of the mesonotum, and basal abdominal segment smooth and shining, the clypeus having a few scattered fine punctures; median segment narrowed at apex and rounded posteriorly. Black; a ⊥-shaped mark on the clypeus, a lunate spot above it, a stripe on each side broadened below, a spot above each antenna, a broad stripe on each cheek, another on the pronotum, two parallel longitudinal lines on the mesonotum, another short one on each side over the tegulæ, a broad squarish mark on the middle of the scutellum, the tubercles, the legs except the coxæ, trochanters, and femora above, and transverse subapical fasciæ on the segments of the abdomen, yellow; the fascia on the 1st abdominal segment broadened in the middle and roundly incised anteriorly on each side, that on the 2nd broad, laterally attenuated on each side of the middle, the fascia on the 3rd segment broadly interrupted in the middle and widest laterally, on the 4th broadest in the middle where it is narrowly interrupted, the 5th segment with a broad truncate cone-shaped spot in the middle, the 6th segment black; legs slightly pubescent; wings hyaline, more or less fuscescent; nervures and tegulæ testaceous.

Var. The longitudinal lines on the mesonotum absent, the fascia on the basal abdominal segment not biemarginate anteriorly, but enclosing a black spot on each side.

♂ similar to the ♀, but with the yellow markings broader, the scape of the antennæ in front and the anterior femora yellow.

Hab. Mussooree; Dehra; Barrackpore; Sikhim; Bangalore; Assam; Burma; Tenasserim; extending into China and the Malayan region. ♀ ♂. *Length* 9–11; *exp.* 16–17 mm.

891. **Ceratina moderata,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head, thorax, and abdomen punctured, the punctures shallow and somewhat distantly placed, on the front of the head and face slightly closer and stronger; thorax in front and on the sides and apex, and abdomen with a thin soft pubescence; median segment rounded posteriorly, the enclosed space at base concave, very minutely punctured and rugose. Black; the clypeus, a broad triangular spot above it, an irregular line on each side along the lower part of the inner orbits, the tubercles, the anterior tibiæ above, the intermediate and posterior tibiæ in front, lengthened spots on each side of the 2nd and 3rd, and small round lateral spots on the 4th segment of the abdomen, yellow; the tibiæ with some ferruginous stains, and the tarsi fusco-ferruginous; pubescence fuscous; wings hyaline, nervures testaceous.

Hab. Mussooree. ♀. *Length* 5; *exp.* 11 mm. Type in coll. Rothney.

892. **Ceratina beata,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

♀. Head smooth, with a few shallow punctures; mesonotum, scutellum, postscutellum, and abdomen finely and closely punctured, the punctures very shallow; mesonotum with an abbreviated longitudinally impressed median line anteriorly; median segment short, opaque, rounded posteriorly, with almost a vertical slope to the apex; the enclosed space at its base contracted, punctured and rugose. Black; the clypeus, a square mark above it, a Y-shaped mark above that, a line on the inner orbits, a transverse line on the occiput, a broad one on each cheek, the prothorax and tubercles, two short inner parallel and two still shorter lateral divergent lines on the mesonotum, the middle of the scutellum and postscutellum, the mesopleuræ below, the mesosternum, the legs, and broad transverse bands on the abdomen, yellow; wings hyaline, nervures testaceous, tegulæ yellow.

Var. a. The clypeus and front up to the anterior ocellus yellow.

Var. b. The mesonotum without the divergent yellow lines on the disc; the yellow bands on the abdomen narrow, widest in the middle.

Hab. Ceylon; Burma; Tenasserim. ♀. *Length* 5–7; *exp.* 9–14 mm.

893. **Ceratina lepida,** *Smith, New Sp. Hym. B. M.* p. 92, ♂; *Dall. Torr. Cat.* x, p. 199.

♀. Head, thorax, and abdomen shining, punctured, the punctures larger and more sparse on the face in front and the mesonotum, densest on the abdomen; median segment with a large lunate concave space at base, widely reticulate. Black; a transverse trilobed spot on the clypeus, a wide subtriangular spot above it, a narrow line along the inner orbits not reaching far above the base of the antennæ, and with the apex below curved inwards, two oblique spots below the anterior ocellus, a broad line on the cheeks, a narrow one on the pronotum, the tubercles, a minute line inside the tegulæ, the base of the scutellum, the anterior femora at apex beneath, a line on the anterior tibiæ above, and narrow transverse fasciæ on the apical margin of abdominal segments 2–5, yellow; the fascia on the 2nd and 3rd segments very widely, and on the 4th narrowly interrupted in the middle, on the 5th segment the fascia is entire and broader than the others; tarsi rufo-testaceous; wings hyaline and iridescent.

♂ similar; the apical segment produced in the middle into a tooth, and the sides angulate; intermediate and posterior legs also variegated with yellow.

Hab. Northern India (*Smith*); Dibrugarh, Assam. ♀. *Length* 10; *exp.* 18 mm. ♂. *Length* 8; *exp.* 16 mm.

894. **Ceratina simillima**, *Smith, Cat.* ii, p. 225; *Dall. Torr. Cat.* x, p. 200.

♀. Resembles *C. lepida*, but is constantly smaller, the head and thorax with much fewer punctures, the lunate space at base of the median segment very finely minutely punctured, opaque-looking; basal segment of abdomen smooth and polished, rest of the segments very finely and densely punctured. The yellow markings are nearly as in *C. lepida*, but there are in addition two short parallel longitudinal yellow lines on the disc of the mesonotum, and a yellow line (sometimes reduced to two spots) on the apical margin of the basal segment of the abdomen; legs testaceous, variegated with yellowish white; wings hyaline and iridescent.

Hab. East Indies (*Smith*); Burma; Tenasserim. ♀. *Length* 6; *exp.* 11 mm. ♂ unknown.

Genus ALLODAPE.

Allodape, *Lepel. Encycl. Méth., Ins.* x, p. 18 (1825).

Type, *A. rufogastra*, Lepel.
Range. Africa; the Oriental region; Australia.

Head transverse, nearly as wide as the thorax; ocelli three, in a triangle on the vertex; antennæ filiform, geniculate, flagellum thickening towards the apex; tongue long; labial palpi 4-jointed, basal two joints elongate, the apical two minute; maxillary palpi 6-jointed, basal joint thick, about as long as the following two, apical three minute, subequal; labrum not notably longer than broad; mandibles narrow, acute. Thorax ovate; legs slender, short; wings moderately broad, fore wing with the radial cell constricted towards the apex and appendiculate; two cubital cells, the 1st longer than the 2nd, the 2nd narrowed towards the marginal and receiving both recurrent nervures. Abdomen cylindrical, of moderate size.

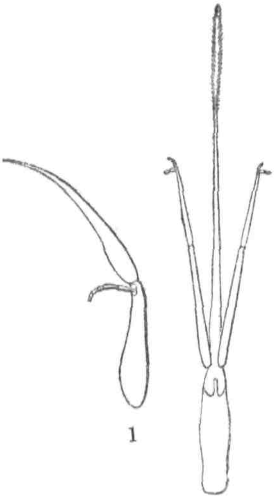

Fig. 170.—*Allodape.* 1, maxilla; 2, labium. (Much enlarged.) After Smith.

Nothing is known of the nesting habits of the species belonging to this genus. In general appearance they are very like the species of *Prosopis*, but can be distinguished at once by their elongate tongues. *A. cupulifera* occurs in company with *P. feæ*, swarming on the wet sands on the banks of streams in Tenasserim.

Key to the Species.

a. Base of 1st abdominal segment depressed in the middle .... *A. cupulifera*, p. 506.
b. Base of 1st abdominal segment not depressed.
  a'. Apical two or three abdominal segments densely punctured .... *A. marginata*, p. 507.
  b'. All the segments of the abdomen smooth, impunctate .... *A. parvula*, p. 507.

895. **Allodape cupulifera,** *Vachal, Ann. Mus. Civ. Gen.* (2ª) xiv, 1894, p. 447, ♂.

♂. Head, thorax, and basal abdominal segment smooth and shining, 2nd and following segments punctured, each puncture emitting a short decumbent fuscous hair; labrum slightly exserted; clypeus transverse anteriorly; 1st abdominal segment depressed in the middle, the sides and apical margin narrowly vertically raised. Black; the labrum, mandibles, clypeus, a line on the scape of the antennæ in front, and the tubercles yellow; the flagellum of the antennæ piceous; the tegulæ and tarsi flavo-testaceous; wings hyaline.

Hab. Karen Hills, Burma; Tenasserim. ♂. *Length* 4–5; *exp.* 8 mm.

896. **Allodape marginata**, *Smith, Cat.* ii, p. 230, ♀.

♀. Head with a few scattered punctures, mesonotum smooth, shining, scutellum and median segment delicately punctured; the basal three segments of the abdomen smooth, apical three punctured, the punctures getting more dense towards the apex; clypeus flat, transverse anteriorly. Black; a broad nail-shaped spot on the front and clypeus, a line on the pronotum, the tubercles, and the tegulæ of the wings pale cream-colour: the labrum, base of the mandibles, and the apical joints of the tarsi testaceous; the posterior legs covered with a pale glittering pubescence; the apical margins narrowly of segments 1–5 of the abdomen very pale testaceous; wings hyaline and iridescent, nervures pale testaceous.

Hab. India? (*Smith*). The type in the British Museum collection is the only specimen I have seen. ♀. *Length* 6; *exp.* 11 mm.

897. **Allodape parvula**, *Smith, New Sp. Hym. B. M.* p. 98, ♀.

♀. Head, thorax, and abdomen smooth, shining and impunctate; face slightly produced below; clypeus flat, transverse anteriorly; median segment somewhat narrowed and rounded posteriorly, the space at base slightly concave and smooth but opaque, not shining. Black; the face below the base of the antennæ and the clypeus in the middle pale yellow; the labrum, the mandibles, tubercles, apical joints of the tarsi, and the apical margins rather broadly of segments 1–5 rufo-testaceous; the posterior tibiæ and tarsi with pale glittering pubescence; wings hyaline and iridescent.

Hab. Bombay district; probably through a great part of India; Burma; Tenasserim. ♀. *Length* 5–6; *exp.* 8–11 mm.

Genus HERIADES.

Heriades, *Spinola, Ins. Lig.* ii, p. 7 (1808).
Chelostoma, *Latr. Gen. Crust. et Ins.* iv, p. 161 (1809).
Trypetes, *Schenck, Nassau. Verein. f. Naturk., Jahr.* xiv, p. 32 (1859).
Eriades, *Dall. Torr. & Friese, Entom. Nachr.* xxi, p. 69 (1895).

Type, *H. truncorum*, Linn.

Range. Both hemispheres.

Head orbicular, about as wide as the thorax; ocelli in a triangle placed well forward on the vertex; antennæ subclavate; labial palpi 4-jointed, the 1st joint about half the length of the 2nd, the latter acute at apex, the apical two joints minute, at right angles to the 2nd joint; the maxillary palpi 3-jointed, the basal joint short, stout, the 2nd twice as long as the 1st, the 3rd slender, with two setæ at apex; clypeus with the anterior margin generally transverse and bidentate, the labrum beneath anteriorly rounded. Thorax short, broadly oval; fore wing with the radial cell long, subacute at apex; two cubital cells, the 2nd receiving both recurrent nervures, the 1st near its base, the 2nd near its apex. Abdomen elongate, cylindrical, furnished with a dense pollen-brush beneath.

Nothing is known of the habits of the Oriental forms. I procured both species on the wet sand by the banks of streams. The European species nest in the wood of old posts and rails.

Key to the Species.

a. ♀ length 8–9 mm. .... *H. aureocincta*, p. 508.
b. ♀ length 4·5–5 mm. .... *H. parvula*, p. 508.

898. **Heriades aureocincta**, n. sp. (Pl. IV, fig. 2.)

♀. Head, thorax, and abdomen closely and finely punctured, shining; clypeus subtriangular, convex, subemarginate anteriorly, with two not very approximate shining blunt teeth; median segment vertical, rounded posteriorly, not truncate, obscurely medially carinate, the base narrowly impunctate, shining; abdomen with a deep transverse narrow groove close to the base of the 2nd segment. Jet-black; the face and legs with a thin covering of pale glittering soft hairs; the scutellum and postscutellum covered with dense fulvo-ferruginous pubescence, and abdominal segments 2–5 with narrow fringes of the same, having a golden lustre; the apical margin of the 1st segment broadly golden testaceous; pollen-brush white; wings hyaline and iridescent; nervures and tegulæ dark brown.

Hab. Sikhim, 6000 ft.; Ta-u plateau, Tenasserim, 4000 ft. ♀. *Length* 8–9; *exp.* 16 mm.

This species perhaps belongs to the subgenus *Chelostoma*, Latr.

899. **Heriades parvula**, n. sp.

♀. Head and thorax coarsely and closely, abdomen more finely punctured; clypeus broad, convex, subtriangular, its anterior margin transverse; median segment longer proportionately than in *H. aureocincta*, broadly transverse posteriorly; base of the abdomen slightly concave, 2nd segment with a very fine transversely impressed line. Jet-black and shining; the face in front, the thorax on the sides and at the apex of the median segment, and the apical margins of abdominal segments 1–5 covered with white pubescence, forming very fine fringes to the last-named; pollen-brush soft and white; wings hyaline and iridescent, nervures and tegulæ very dark brown.

Hab. Rangoon, Burma. ♀. *Length* 4·5–5; *exp.* 8 mm.

Genus CŒLIOXYS.

Cœlioxys, *Latr. Gen. Crust. et Ins.* iv, p. 166 (1809).

Type, *C. conicus*, Linn.
Range. Both hemispheres.

Head transverse, about as wide as the thorax, or in some species wider; eyes pubescent; ocelli in a triangle on the vertex; antennæ filiform; labial palpi 4-jointed, basal two joints elongate, the 2nd somewhat longer than the 1st, apical two minute, articulated at an angle near apex; maxillary palpi 3-jointed, basal joint shortest, the 2nd thicker, apical joint ovate; labrum elongate, the sides nearly parallel, base broad and produced at the lateral angles. Thorax short, more or less globose, the scutellum with a lateral curved tooth at base; fore wing with an elongate radial cell subacute at apex; two cubital cells subequal in length, the 2nd receiving the two recurrent nervures at base and apex respectively; the 1st transverse cubital nervure oblique, the 2nd angled and bent inwards; legs feeble, slight. Abdomen somewhat elongate, conical, the base truncate, acute at apex (♀), obtuse dentate (♂). The male has also the anterior coxæ toothed and the claws bifid.

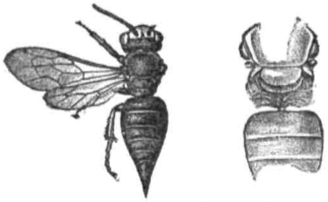

Fig. 171.—*Cœlioxys basalis*, ♀. $\frac{3}{1}$.

The species of *Cœlioxys* are parasitic in the nests of *Megachile*. I have often watched *C. basalis* alight near the nest of *Megachile lanata*, while the latter was working, remain perfectly still until the *Megachile* had gone off to collect fresh pollen, then slip in, turn round, and poke its big head out of the entrance to the nest, which it fairly blocked. Sometimes the *Cœlioxys* departed before the *Megachile* had returned, but occasionally remained in the nest with its head blocking up the entrance, and for a long time kept the rightful owner at bay on her return to the nest.

Key to the Species.

Females.

A. Ventral plate of apical abdominal segment more or less spoon-shaped.	
a. Scutellum long, subangular in middle posteriorly	*C. decipiens*, p. 510.
b. Scutellum short, broadly arched in middle posteriorly.	
a'. Second and third abdominal segments with deep transverse grooves	*C. fuscipennis*, p. 511.
b'. Second and third abdominal segments not grooved	*C. angulatus*, p. 511.
B. Ventral plate of apical abdominal segment conical, more or less acutely pointed.	
a. Head with rich fulvous pubescence	*C. ducalis*, p. 512.
b. Head with snow-white pubescence.	
a'. Under 9 mm. long.	
a^2. Front with a medial vertical carina ..	*C. minutus*, p. 512.
b^2. Front not carinate	*C. capitatus*, p. 512.

b'. Over 11 mm. long.
  *a*². Apical margin of clypeus with fulvous pubescence. . . . . *C. basalis*, p. 513.
  *b*². Apical margin of clypeus with white pubescence.
    *a*³. Tarsi with golden pubescence. . . . . . *C. sexmaculatus*, p. 513.
    *b*³. Tarsi with white pubescence.
      *a*⁴. Dorsal and ventral plates of apical abdominal segment equal or nearly equal . . . . *C. cuneatus*, p. 514.
      *b*⁴. Dorsal plate of apical abdominal segment much shorter than ventral plate . . . . *C. confusus*, p. 514.

Males.

A. Apical abdominal segment furnished with 4 spinous teeth.
  a. Length 7 mm. . . . . *C. minutus*, p. 512.
  b. Length 11 mm. . . . . *C. cuneatus*, p. 514.
  c. Length 14 mm. . . . . *C. argentifrons*, p. 515.
B. Apical abdominal segment with 6 spinous teeth.
  a. Scutellum comparatively long, narrowly arched, subangular posteriorly . . . . *C. decipiens*, p. 510.
  b. Scutellum comparatively short, broadly arched posteriorly. . . . . *C. confusus*, p. 514.
C. Apical abdominal segment with 8 spinous teeth.
  a. Length 6·5 mm. . . . . *C. capitatus*, p. 512.
  b. Length 13 mm. . . . . *C. basalis*, p. 513.

900. **Cœlioxys decipiens.** (Pl. IV, fig. 1.)

Spin. Ann. Soc. Ent. Fr. vii, 1838, p. 532, ♀ ♂; *Dall. Torr. Cat.* x, p. 485.

Cœlioxys apicata, *Smith, Cat.* ii, p. 267.

♀. Head and thorax closely and finely, abdomen more minutely and densely punctured; clypeus convex, transverse anteriorly, the lower lateral angles slightly produced; scutellum with a strong triangular lateral tooth, its posterior margin narrowly arched, almost angular in the middle; abdomen with the base of the 2nd and following segments slightly depressed; the dorsal plate of the apical segment constricted towards the apex and sharply carinate down the middle, the ventral plate broad spoon-shaped and rounded at apex, which projects well beyond the apex of the dorsal plate. Black; the clypeus, the face to a little above the base of the antennæ, the cheeks and occiput, the sides of the thorax, and the apical margins of abdominal segments 1–5 narrowly covered with snow-white pubescence; these marginal bands not or scarcely widened laterally; wings hyaline at base, subfuscous for half their length at apex.

♂ similar, smaller; the 3rd abdominal segment above with deeply marked lateral transverse sulcations, the hollows covered with white pile; the apical segment deeply indented at apex and

furnished with six teeth, one on each side at base, thin and acute, four apical, two above and two below, stouter, subequal.

Hab. Egypt; Aden; Punjab; North-West Provinces; Bengal; Southern India; Burma; Tenasserim, ♀. *Length* 11–12; *exp.* 22–25 mm. ♂. *Length* 10–11; *exp.* 20–22 mm.

901. **Cœlioxys fuscipennis,** *Smith, Cat.* ii, p. 266, ♀; *Dall. Torr. Cat.* x, p. 487.

♀. Head and thorax very closely punctured, cribrate; basal abdominal segments finely and closely punctured, 2nd and 3rd segment with a deep transverse groove in the middle above, the sides of the groove smooth and shining, the base of the segments coarsely and the apical margins finely punctured; segments 3–6 finely and closely punctured; clypeus subtriangular, transverse anteriorly, thinly pubescent; scutellum broadly rounded posteriorly, the lateral teeth narrow and acute; apical segment slightly flattened, the dorsal plate subacute, rounded posteriorly, with a medial longitudinal carina, and a broad shallow depression along the lateral and apical margins; ventral plate acutely spoon-shaped, slightly longer than the dorsal plate. Black: the sides of the face, the front, cheeks, and transverse bands on the apical margins of segments 1–5 of the abdomen with dense, the clypeus and legs with thin snow-white pubescence; the transverse bands on the abdomen broadening greatly on the sides and beneath; wings fuscous, subhyaline towards their base.

Hab. India (*Smith*); Burma; Tenasserim. ♀. *Length* 12–13; *exp.* 21–23 mm. ♂ unknown.

902. **Cœlioxys angulatus,** *Smith, Trans. Zool. Soc.* vii, p. 192, ♀; *Dall. Torr. Cat.* x, p. 482.

♀. Head, thorax, and basal abdominal segment strongly and closely, the rest of the abdomen more sparsely and lightly punctured; the punctures on the head and thorax coarse but distinct, not confluent; the apical abdominal segment smooth, almost impunctate above; clypeus broad, transverse anteriorly, the front above the antennæ with a broad but not well-marked vertical carina; the scutellum broadly rounded posteriorly, the lateral teeth acute and bent downwards; abdomen broad, conical, the apical segment comparatively broad, rounded posteriorly; the ventral plate not or scarcely projecting beyond the dorsal plate. Black, with white pubescence, dense and short on the clypeus anteriorly, the sides of the face, the sides of the thorax, and legs; on the median segment it is slightly longer; abdomen with broad lateral patches of snow-white short pubescence, and fine transverse bands of the same along the apical margins of segments 1–5; wings fusco-hyaline, clearer towards the base.

Hab. Mainpuri, N.W.P. ♀. *Length* 11–13; *exp.* 24 mm.

903. **Cœlioxys ducalis,** *Smith, Cat.* ii, p. 267, ♀; *Dall. Torr. Cat.* x, p. 485.

♀. Head densely pubescent, thorax very closely and finely punctured; the bases of the abdominal segments, and especially the sides near the base, finely and closely, the apical margins coarsely and more sparsely punctured, the apical segment above dull opaque, very minutely and densely punctured; clypeus subtriangular, its anterior margin widely arched; mesonotum with a medial longitudinal, short and rather obscure carina on the disc posteriorly, an impressed longitudinal line on each side of it and another impressed longitudinal line at both sides near the tegulæ; apical abdominal segment acutely narrowed, the ventral plate longer than the dorsal and ciliated on each side with very short stiff hairs, giving it the appearance of being minutely serrate. Black; the head covered with a rich fulvous pubescence, slightly fuscous on the posterior margin of the cheeks; antennæ piceous; abdominal segments 2–5 with indications of lateral white pubescent spots at their bases; wings dark fuscous, with a brilliant coppery effulgence.

Hab. India? (*Smith*). ♀. *Length* 22; *exp.* 39 mm.

904. **Cœlioxys minutus,** *Smith, New Sp. Hym. B. M.* p. 106, ♀; *Dall. Torr. Cat.* x, p. 488.

♀. Closely allied to and resembling *C. capitatus*, Smith; differs in the head and thorax being more sparsely punctured, the front from beneath the anterior ocellus to halfway down the clypeus with a distinct fine carina, the pubescent spots on the mesonotum anteriorly and at the base of the scutellum wanting, the dorsal plate of the apical abdominal segment much shorter than the ventral, both tapering to a point.

♂ similar to the female: differs from the male of *C. capitatus* in the apical segment being furnished with only four teeth or spines and a lateral spine on the 5th ventral segment.

Hab. Bombay; Malabar; Burma; Tenasserim. ♀. *Length* 7·5–8; *exp.* 15–16 mm. ♂. *Length* 7; *exp.* 15 mm.

905. **Cœlioxys capitatus,** *Smith, Cat.* ii, p. 267, ♀ ♂; *Dall. Torr. Cat.* x, p. 483.

♀. Head and thorax very broad, the former subquadrate, both closely and very coarsely punctured; abdomen acutely conical, more finely punctured, the punctures on the basal segment densest; clypeus flat anteriorly, nearly transverse; scutellum with two minute medial teeth and a large blunt tooth on each side at the lateral angles posteriorly; apical abdominal segment acutely pointed, its dorsal plate medially carinate on its apical half, ventral plate acutely pointed and notched at extreme apex, projecting considerably beyond the dorsal plate. Jet-black; the clypeus thinly, the front, cheeks, two spots on the mesonotum anteriorly, two spots at the base of the scutellum, one on each tegula, the sides of the thorax, the legs more or less, and transverse

fasciæ, narrow in the middle, wide laterally, on the apical margins of abdominal segments 1–5 covered with dense white pile; the legs dark ferruginous; wings hyaline at base, fuscous towards their apical margins.

♂ similar, the legs often black; apical abdominal segment armed with eight spinous teeth, one on each side at base and six terminal, four above and two below.

Hab. Northern India; Bengal; Ceylon; Burma; Tenasserim.
♀. *Length* 7; *exp.* 13 mm. ♂. *Length* 6·5; *exp.* 13 mm.

906. **Cœlioxys basalis,** *Smith, Trans. Ent. Soc.* 1875, p. 48, ♂ ♀; *Dall. Torr. Cat.* x, p. 483.

♀. Head above and thorax closely and finely punctured, with a tendency on the mesonotum to run into irregular striæ; clypeus slightly convex, rounded anteriorly, the space between the antennæ and narrowly up the front to the anterior ocellus raised and medially carinated; scutellum evenly rounded posteriorly, each of its lateral angles furnished with a strong downward-bent tooth; abdomen shining, elongate, the base of the segments lightly, the apical half strongly and evenly punctured; the apical segment with its dorsal plate strongly compressed, cylindrical, sparsely and finely punctured, bearing a fine medial longitudinal carina on its apical half; ventral plate also compressed, projecting beyond the dorsal plate, the apex of both dorsal and ventral plates acute. Black, the margin of the clypeus with fulvous pubescence; the rest of the clypeus and front, the cheeks, a line over the tegulæ, a tuft behind and beneath them, and the apical margins, slightly widening laterally, of abdominal segments 1–5 covered with snow-white pubescence: the legs with a thin white pile; wings clear hyaline on their basal, dark fuscous with purple effulgence on their apical halves.

♂ similar, smaller; segments 2–5 of the abdomen with lateral abbreviated transverse grooves near their bases; the apical segment armed with eight teeth, one on each side at base and six terminal, four above and two below; the pubescence on the clypeus entirely white; the pubescent bands on the abdomen widening a good deal laterally.

Hab. Bengal; Bangalore, Southern India; Burma; Tenasserim.
♀. *Length* 15–16; *exp.* 25–26 mm. ♂. *Length* 13; *exp.* 24 mm.

*907. **Cœlioxys sexmaculatus,** *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

"♀. Head on the vertex and front, pronotum, mesonotum, scutellum, the basal and the apical segments of the abdomen punctured, coarsely on the mesonotum, more finely and closely on the scutellum; the transverse furrow on the 2nd abdominal segment rugose; the apical segment with a central longitudinal carina, thickening towards the apex, which is depressed on each side of it; the scutellar spines stout. Black; the head in front and the sides of the thorax densely covered with snow-white

pubescence; two spots at the base of the mesonotum, two smaller behind the tegulæ, two at the base of the scutellum, a line on the apical margin of the 1st abdominal segment, a central longitudinal line on its ventral side, and the apical margins of the remaining ventral segments covered with white pubescence; tarsi of the legs with short golden pubescence; wings hyaline at base, fuscous towards the apex.

"*Hab.* Barrackpore. ♀. *Length* 11 mm."

908. **Cœlioxys cuneatus,** *Smith, Trans. Ent. Soc.* 1875, p. 49, ♀; *Dall. Torr. Cat.* x, p. 485.

♀. Head and thorax densely and not very coarsely, abdomen more finely and sparsely punctured; punctures on the apical segment above very close and minute, giving it an opaque appearance; clypeus slightly convex and densely pubescent; scutellum short, narrow, very slightly arched posteriorly, nearly transverse, the lateral teeth short and blunt; apical abdominal segment strongly convex for two-thirds of its length from base, the apical third suddenly narrowed, acute at apex and bearing a medial longitudinal carina above; the ventral plate very slightly longer than the dorsal. Black; the head in front, clypeus and cheeks, the sides of the thorax, and narrow, transverse, uninterrupted bands on the apical margins of segments 1–5 of the abdomen with dense snow-white pubescence; wings slightly fuscous, hyaline at base.

♂ similar; the abdomen more densely and finely punctured, the basal three segments with narrow but deep transverse grooves, the apical margins of segments 1–5 narrowly recurved, the apical segment deeply grooved at apex and armed with four teeth, and a lateral tooth on the 5th ventral segment.

Hab. Barrackpore; Tenasserim. ♀. *Length* 11–12; *exp.* 19–20 mm. ♂. *Length* 11; *exp.* 19 mm.

909. **Cœlioxys confusus,** *Smith, Trans. Ent. Soc.* 1875, p. 50, ♀; *Dall. Torr. Cat.* x, p. 484.

♀. Head and thorax coarsely cribrately punctured, the posterior margin of the scutellum narrowly smooth; abdomen sparsely and finely punctured, the punctures most dense on the basal segment; clypeus slightly convex, very large, transverse anteriorly; scutellum comparatively short, rounded posteriorly, the lateral teeth short and acute; abdomen sharply conical, attenuated at apex; the dorsal plate of the apical segment acute, medially carinated towards apex, with a depression on each side; ventral plate projecting beyond dorsal plate, extremely narrow and fine. Black; the clypeus, face, cheeks, sides of the thorax, and legs with a thin white pubescence, a pubescent white spot behind the tegula of each wing and another at the lateral basal angle of the scutellum; wings dark fuscous beyond the 1st cubital cell, hyaline at base.

♂ similar; the apical segment divided by a deep groove at apex and armed with six teeth, the 5th segment with a sharp lateral spine.

Hab. Lucknow; Barrackpore; Burma; Tenasserim; Ceylon. ♀. *Length* 12; *exp.* 22 mm. ♂. *Length* 11; *exp.* 22 mm.

910. **Cœlioxys argentifrons,** *Smith, Trans. Ent. Soc.* 1875, p. 48, ♂; *Dall. Torr. Cat.* x, p. 482.

♂. Head, thorax, and abdomen shining, finely punctured, the punctures on the head and thorax very dense and somewhat larger than on the abdomen, the punctures most sparse in the middle of the segments of the latter; clypeus broad, very slightly convex, its anterior margin transverse; scutellum narrowly rounded, almost subangular posteriorly, the lateral teeth broad and blunt; abdomen with segments 2–5 laterally slightly excavated, the hollows transverse and pubescent; the margins of segments 1–5 narrowly smooth, polished, and recurved, the 6th segment produced into two broad teeth with a deep hollow between, the teeth at apex emarginate, the 5th segment with a small lateral tooth beneath. Black; the clypeus, face, cheeks, sides of the thorax, sides and apex of the median segment, apical margins and lateral basal hollows of the abdominal segments with snow-white pubescence; wings light fuscous, becoming clear hyaline at base.

Hab. Barrackpore, Bengal. ♂. *Length* 14; *exp.* 25 mm. ♀ unknown.

Genus MELECTA.

Melecta, *Latr. Hist. Nat. Ins.* xiv, p. 48 (1805).
Crocisa, pt., *Jurine, Hym.* p. 239 (1807).
Symmorpha, *Klug, Illig. Mag., Ins.* vi, p. 227 (1807).

Type, *Melecta luctuosa*, Scop.

Range. Both hemispheres.

Head transverse, narrower than the thorax; ocelli in a curve on the vertex; antennæ longish, filiform, basal joint of flagellum clavate; labial palpi 4-jointed, basal joint thrice the length of the 2nd, apical two minute; maxillary palpi 5-jointed. Thorax subglobose, the scutellum bidentate; fore wing with the marginal cell narrow, rounded both at base and apex; three cubital cells, the 1st the largest, the 2nd very strongly contracted towards the radial, receiving the 1st recurrent nervure past the middle, the 2nd transverse cubital nervure angled and bent inwards; the 3rd cubital cell arched outwards, receiving the 2nd recurrent nervure about the middle; legs moderately long, pubescent, the pubescence dense and short. Abdomen conical at apex, truncate at base.

Fig. 172.—*Melecta himalayana*, ♀. $\frac{3}{2}$.

So far as I know, no species of *Melecta* has hitherto been recorded from India, and nothing is known of the habits of the one species here described; the European *M. luctuosa* is known to be parasitic on *Anthophora*.

911. **Melecta himalayana**, n. sp.

♀. Densely pubescent; the thorax, underneath the pubescence, very closely and finely punctured; the vertex of the head and base of the segments of the abdomen smooth. Head and abdomen, underneath the pubescence, alutaceous; thorax black; the clypeus, the face below the antennæ and along the inner orbits of the eyes, and the thorax covered with long silky pale yellow pubescence; the front below the vertex and a broad transverse stripe between the wings with pale brown pubescence; the antennæ and legs alutaceous, the front of the scape and the outside of the intermediate and posterior legs clothed with brown pubescence; wings hyaline, slightly iridescent, with a brownish tint, the nervures and tegulæ brown; abdomen with the base of the 1st and 2nd segments sparsely, their margins and the apical segments densely, clothed with rich ferruginous pubescence.

Hab. Kumaun, 5000 ft., and probably throughout the Himalayas at and above that altitude. ♀. *Length* 14; *exp.* 23 mm.

Genus **CROCISA**.

Crocisa, *Jurine*, *Hym.* p. 239 (1807).

Type, *Crocisa histrio*, Fabr.

Range. Europe, Africa, and the Oriental region.

Head not so wide as the thorax, transverse; eyes strongly narrowed and contracted above; face below the bases of the antennæ and the clypeus subporrect, labrum bent downwards at an angle to the margin of the clypeus; mandibles narrow, simple, acute at apex; mentum and labrum of about equal length; labial palpi 5-jointed, the basal joint elongate, full half the length of the mentum, the 2nd less than half the length of the basal joint, the 3rd half the length of the 2nd; the apical two minute, articulated on one side of apex of 3rd joint; maxillary palpi 2-jointed. Thorax short; scutellum flat, produced into a plate posteriorly and emarginate; legs moderately stout: wings broad and ample; fore wing with the radial cell narrow, rounded at base and apex; three cubital cells, the 1st measured on the cubital nervure equal in length to the 2nd and 3rd united; the 2nd strongly constricted towards the radial cell by the very marked curving inwards above of the 2nd transverse cubital nervure; the 3rd subcrescentic; the 3rd transverse cubital nervure having a curve

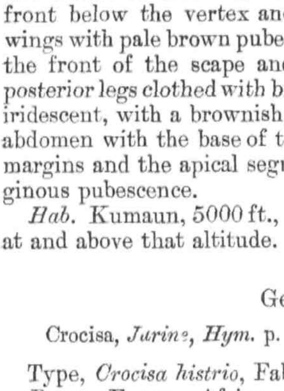

Fig. 173.—*Crocisa*. 1, maxilla; 2, labium. (Much enlarged.)

parallel to the curve of the 2nd transverse cubital nervure; the 2nd and 3rd cubital cells each receive a recurrent nervure past the middle. Abdomen conical, sharply acute at apex.

So far as I know, the Indian species of *Crocisa* are parasitic in the nests of *Anthophora* only. Though comparatively small, the species are very conspicuous even on the wing, from the blue or white banding or spotting of the abdomen.

Key to the Species.

A. Fore wing fuscous, with a few hyaline spots on disc.	
a. Scutellum posteriorly with a shallow ∼-shaped emargination; pubescence blue ..	*C. emarginata*, p. 517.
b. Scutellum posteriorly with a deep Λ-shaped emargination; pubescence white.	
a'. Lateral spot on 2nd abdominal segment simple, with no prolongation anteriorly.	*C. histrio*, p. 518.
b'. Lateral spot on 2nd abdominal segment with an L-shaped branch prolonged anteriorly	*C. ramosa*, p. 518.
c. Scutellum posteriorly with a regular arched and wide emargination	*C. minuta*, p. 519.
B. Fore wing subhyaline, apical margin broadly fuscous	*C. massurii*, p. 519.

912. **Crocisa emarginata**, *Lepel. Hym.* ii, p. 449, ♀ ♂.
Crocisa decora, *Smith, Trans. Ent. Soc.* n. s. ii, 1852, p. 41, ♀.
Crocisa elegans, *Smith* (*nec Mocsary*), *New Sp. Hym. B. M.* p. 107, ♀.
? Crocisa himalayensis, *Rad. Bull. Soc. Nat. Mosc.* n. s. vii, 1894, p. 1[illegible]1.

♀. Head, thorax, and abdomen finely and closely punctured, each puncture, except on the front immediately below the ocelli, emitting a decumbent short hair, often in parts abraded; clypeus slightly convex, the antennal ridge sometimes well developed, sometimes small; the scutellum posteriorly with a ∼-shaped incision, sometimes deeper, sometimes shallower, but never Λ-shaped as in *C. histrio*. Black; the clypeus, the face on each side between and above the bases of the antennæ, the occiput and cheeks, an ill-defined spot on each side of the pronotum spreading on to the mesonotum, a medial abbreviated longitudinal streak on the latter, a spot on each side of it, a bent line over the tegulæ (sometimes reduced to a spot) curving round to but not meeting at the apex of the mesonotum, a medial spot above the emargination at the apex of the scutellum, or a spot on each side of the emargination (these spots in the majority of specimens are absent), a large square ill-defined patch under and a little before the base of the wings, a stripe on each of the tibiæ and tarsi above (the latter stripes very often wanting), two broad lateral spots, emarginate within, on the basal abdominal segment, and elongate maculæ on each

side of the other segments (apical excepted), of dense short pubescence, varying in colour from rich dark blue to pale bluish-white, the inner branches of the emarginations on the 1st abdominal segment often stretching out and forming a continuous broad band at the base of the abdomen; fore wing dark fuscous with a purple effulgence, and a few hyaline spots above the cubital cells; hind wing much paler, sometimes entirely hyaline.

♂ similar; the 6th abdominal segment with or without a lateral spot of blue pubescence.

Hab. Sikhim; Calcutta; Bombay; Malabar; Ceylon; Burma; Tenasserim; on the west extending to South Africa, on the east to China and the Malay Archipelago. ♀. *Length* 10–15; *exp.* 23–28 mm. ♂. *Length* 9–13; *exp.* 24–29 mm.

913. **Crocisa histrio.**

Nomada histrio, *Fabr. Syst. Ent.* p. 388.
Crocisa histrio, *Dall. Torr. Cat.* x, p. 320.

♀. Head above the antennæ finely and closely punctured; thorax and abdomen finely and closely aciculate; antennal carina prominent; scutellum with a Λ-shaped incision at apex. Black; the clypeus thinly, the sides of the face, the cheeks, and a spot on each side on the occiput covered with dense white pubescence; a spot on each side of the pronotum spreading to the mesonotum, a medial short longitudinal line on the latter anteriorly, a spot on each side of it, a spot over each tegula, a spot on it posteriorly, a spot on each side of the mesonotum at apex, a spot beneath the Λ-shaped incision, a broad line under the base of the wings reaching posteriorly to the median segment, a broader patch anteriorly on the mesopleuræ, a broad line on the tibiæ and the basal joint of the tarsi above, and lateral spots on abdominal segments 1–5 above, covered with dense snow-white pubescence; the spot on the 1st segment elongate and produced perpendicularly at its posterior margin; fore wing dark fuscous, with some hyaline spots on the disc; hind wing hyaline, fuscescent at apex.

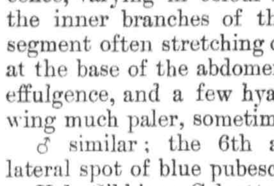

Fig. 174.
Crocisa histrio, ♀. $\frac{4}{3}$.

♂ similar; a lateral spot on the 6th abdominal segment also.

Hab. N.W. Provinces; Bengal; Southern India. ♀ ♂. *Length* 15–17; *exp.* 30–34 mm.

914. **Crocisa ramosa,** *Lepel. Hym.* ii, p. 451; *Dall. Torr. Cat.* x, p. 321.

♀ ♂. Closely allied to and resembling *C. histrio*, Fabr., but a shorter, broader insect proportionately; the incision on the scutellum posteriorly broader; the face and clypeus more densely pubescent; the lateral spot on the 2nd abdominal segment always produced anteriorly; the wings slightly paler in colour.

Hab. Kumaun; Bombay; Madras; Ceylon; Burma. ♀ ♂. *Length* 10–13; *exp.* 25–26 mm. This is a widespread species, occurring also in Europe, Egypt, Arabia, and South Africa. I can find no differences between it and *C. histrio* except those mentioned above, which are constant in a large series examined.

*915. **Crocisa minuta**, *Rad. Bull. Soc. Nat. Mosc.* n. s. vii, 1894, p. 168, ♀ ♂; *Dall. Torr. Cat.* x, p. 321.

"♀. Black. Head covered with white pubescence. Two large spots on the margin of the thorax, with a longitudinal medial line, two spots on the back and two on the posterior margin, a line bordering the tegulæ, another on the tegulæ, and a third under the wings, all of white pubescence; surface of the scutellum flat, posterior margin widely emarginate. Abdomen dull, the posterior margins of the segments with a line of white pubescence interrupted in the middle; on each side of the basal two segments these lines give place to a perpendicular line; the 2nd, 3rd, and 4th ventral segments with, on each side, a spot of white pubescence. The tibiæ and two joints of the tarsi above covered with white hairs. Anterior wings smoky.

"♂ resembles the female; the 6th abdominal segment with two white spots.

"*Hab.* Mussooree, N.W. Provinces, India. ♀ ♂. *Length* 8 mm."

916. **Crocisa massurii**, *Rad. Bull. Soc. Nat. Mosc.* n. s. vii, 1894, p. 169, ♀ ♂; *Dall. Torr. Cat.* x, p. 321.

♀. Head, thorax, and abdomen finely and closely punctured, pubescent; scutellum with its posterior margin widely and not very deeply emarginate, the emargination forming a perfect arch, in some specimens with a slight further incision in the middle. Black; the head except on the vertex, the pronotum, a line along the sides of the mesonotum passing by the tegulæ and continued along the base of the scutellum, a medial line with a spot on each side on the mesonotum anteriorly, a broad band underneath the wings, a broad longitudinal spot on each side of the basal two abdominal segments, each spot on the 1st segment giving out two perpendicular lines not meeting in the middle of the segment above, and that on the 2nd segment giving out one perpendicular line also not meeting above, and elongate spots on each side of the rest of the segments (apical segment excepted) covered with bluish-white pubescence; legs variegated on the tibiæ and tarsi above with like pubescence; wings subhyaline, broadly fuscous along their apical margins.

♂ similar; a spot on each side of the 6th segment of bluish-white pubescence.

Hab. Mussooree; Kumaun; Sikhim (1800 ft.). ♀. *Length* 13; *exp.* 24 mm. ♂. *Length* 10–11·5; *exp.* 21–22 mm.

Genus TETRALONIA.

Tetralonia, *Spin. Ann. Soc. Ent. Fr.* vii, p. 538 (1838).

Type, *T. basizona*, Spin.

Range. Both hemispheres.

Head transverse, not so wide as the thorax; inner orbits of eyes parallel, ocelli almost in a line on the vertex; antennæ filiform, of extraordinary length in the male; clypeus subporrect, labrum prominent, placed at an angle to the clypeus; labial palpi 4-jointed, maxillary palpi 6-jointed. Thorax broad, depressed; fore wing with the marginal cell subacute at apex, the apex not approximate to the costal margin; three cubital cells, the 2nd the smallest, receiving the 1st recurrent nervure near the apex, the 1st transverse cubital nervure oblique, the 2nd almost vertical, the 3rd strongly bent inwards, making the 3rd cubital cell at top about half the length it is below, the 2nd recurrent nervure received very nearly at the apex of the 3rd cubital cell; legs slight, the posterior tibiæ not so densely pubescent as in the genus *Anthophora*. Abdomen short, broad, depressed, subcordate.

Fig. 175.—*Tetralonia duvaucelii*, ♂. $\frac{2}{1}$.

Nothing is known of the habits of the two Indian species of this genus.

Key to the Species.

a. Clypeus yellow	*T. duvaucelii*, p. 520.
b. Clypeus black	*T. himalayensis*, p. 521.

917. **Tetralonia duvaucelii**, *Lepel. Hym.* ii, p. 98, ♂.
Tetralonia elegans, *Smith, Cat.* ii, p. 302, ♂; *Dall. Torr. Cat.* x, p. 232.

♂. Head, thorax, and abdomen densely pubescent; the clypeus nearly square, very slightly emarginate anteriorly, and very lightly punctured; thorax above under the pubescence closely and more strongly punctured; abdomen with the apical margins of segments 1–5 non-pubescent and very finely aciculate. Black; the face below the base of the antennæ, the clypeus, labrum, and mandibles at base yellow, the latter at apex and the 3rd and following joints of the flagellum of the antennæ testaceous red; the face above the bases of the antennæ, the cheeks and occiput, the thorax, and base of the abdomen with pale fulvous-yellow pubescence, that on the legs silvery; base of abdominal segments 2–4 with transverse fasciæ of white, the 5th segment entirely covered with white, and the 6th and apical segments with fuscous pubescence; wings hyaline, faintly clouded at their apical margins.

Var. The pubescence more or less fulvous.

Hab. India (*Smith*); Kumaun (*Miss A. Brook*); Bombay. ♂. *Length* 10–11; *exp*. 18 mm. ♀ unknown.

918. Tetralonia himalayensis, n. sp.

♂. Head and thorax densely pubescent, abdomen nearly bare (probably due partly to attrition), head and the disc of the mesonotum under the pubescence closely and somewhat coarsely punctured; base of the 1st abdominal segment rather coarsely, of the remaining segments finely and densely punctured; clypeus widely emarginate anteriorly; antennæ moniliform, as long as the thorax and abdomen united. Black; the pubescence on the face below the base of the antennæ sordid white, on the head above, thorax, legs, and base of the abdomen fulvous-brown, abdominal segments 2–4 at base above with traces of white pubescent fasciæ; wings hyaline, nervures and tegulæ testaceous.

Hab. Kumaun (*Miss A. Brook*). ♂. *Length* 13; *exp.* 24 mm. ♀ unknown. Type in the British Museum.

Genus HABROPODA.

Habrophora, *Smith, Cat.* ii, p. 318 (1854).
Habropoda, *Smith, t. c.* p. 320 (note).

Type, *H. zonatula*, Smith.

Range. Both hemispheres.

Head transverse, the front below the base of the antennæ and the clypeus raised, subporrect, the labrum bent at an angle to the clypeus; the antennæ filiform; the ocelli in a triangle on the vertex

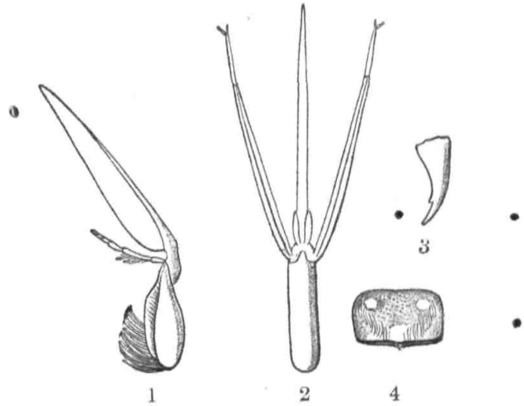

Fig. 176.—*Habropoda.* 1, Maxilla; 2, labium; 3, mandible; 4, labrum. (Much enlarged.)

eyes in the male proportionately larger and closer together than in the female; labial palpi 4-jointed, the basal joint equal in length to the 2nd, the apical two minute, articulated to the side near the apex of the 2nd joint; maxillary palpi 6-jointed, the basal joint much shorter than the 2nd, the 3rd slightly longer than the 1st,

the apical three joints each in succession shorter than the preceding. Thorax broad, orbicular or ovate; legs stout; in the female the posterior tibiæ flattened with their apex above produced on the inside of the basal joint of tarsi *; in the male posterior femora more or less swollen, posterior tibiæ flattened with their apex beneath produced; fore wing with the radial cell long, the apex acute in females, rounded in the males; three cubital cells, the 2nd and 3rd subequal, the 2nd more or less quadrate, the 1st recurrent nervure interstitial with the 2nd transverse cubital nervure, the 2nd recurrent nervure received very nearly at the apex of the 3rd cubital cell. Abdomen broad at base, acutely conical at apex.

Nothing is on record of the habits of the Indian species, but they probably resemble those of *Anthophora*.

Key to the Species †.

a. Pubescence hoary white, in some specimens fuscous grey .... *H. radoszkowskii*, p. 522.
b. Pubescence pale fulvous.
  a'. Abdomen entirely pale honey-yellow .. *H. moelleri*, p. 523.
  b'. Abdomen black, margins of segments 1–6 and whole of 7th testaceous...... *H. magrettii*, p. 523.

919. **Habropoda radoszkowskii.**

Habropoda montana, *Rad.* (*nec Cress.*) *Wiadom. z nauk Przyrod.* 1882, pt. ii, p. 76.
Podalirius radoszkowskii, *Dall. Torr. Cat.* x, p. 285.

♀. Head above, the thorax, and abdomen densely, the face below the base of the antennæ and the clypeus thinly pubescent; the last rugosely punctured, bearing a short medial vertical carina at base, the apex margined, and just above it in the middle a small bare triangular space, sometimes slightly depressed and often reduced much in size; the posterior tibiæ much flattened, and bare and smooth on the inside, the apex produced over and on the inside of the basal joint of the tarsi; abdomen broad, acutely conical at apex. Black; the triangular spot on the clypeus pale yellow; pubescence from hoary to fuscous-grey, turning to ferruginous towards the apex of the abdomen above; on the outside of the intermediate and posterior tibiæ and of all the tarsi it is very dense and glittering bright ferruginous; wings fusco-hyaline, nervures and tegulæ testaceous.

Fig. 177.
Habropoda radoszkowskii, ♀. 3/2.

* I have described the characters as found in the Indian species.
† A key to the males only can be given, as the female of but one species is known.

♂ similar, the legs longer; the yellow spot on the clypeus elongate, becoming almost a medial streak; the apical margins of abdominal segments 1-5 broadly pale testaceous; the posterior femora very slightly swollen, each posterior tibia produced at its inferior apex into a compressed, thin, rounded plate.

Hab. The Himalayas from Sikhim to Simla, above 4000 feet. ♀ ♂. *Length* 13–16; *exp.* 29–35 mm.

920. **Habropoda magrettii**, n. sp. (Pl. IV, fig. 6.)

♂. Head, legs, and abdomen thinly, thorax densely pubescent, the pubescence fine, long and soft on the last; clypeus convex, bell-shaped, margined anteriorly, not carinate down the middle; vertex round the region of the ocelli, the thorax and abdomen underneath the pubescence densely and finely punctured; legs long and stout, posterior femora swollen, posterior tibiæ flattened, their apex beneath produced and bluntly rounded. Black; the clypeus, sides of the face below the base of the antennæ, the labrum, and base of the mandibles bright yellow; the scape, the 2nd joint of the flagellum of the antennæ, and the legs dark honey-yellow; the basal, the 3rd and following joints of the flagellum fulvous brown; the apical margins broadly of the basal six and the whole of the 7th abdominal segment light pale testaceous; the pubescence entirely very pale fulvous; wings light flavo-hyaline.

Hab. Kumaun. ♂. *Length* 13; *exp.* 24 mm. ♀ unknown.

921. **Habropoda moelleri**, n. sp.

♂. Head, legs, and abdomen thinly, thorax densely pubescent, the pubescence fine, long and soft on the last; clypeus convex, twice as high as broad, bell-shaped, margined anteriorly and bearing a slight medial vertical carina; vertex of the head shining, somewhat closely punctured round the region of the ocelli; legs stout and long, the posterior femora swollen, the posterior tibiæ flattened, the apex beneath triangularly produced. The head in front, the clypeus, the scape of the antennæ, the legs, and abdomen honey-yellow; the vertex of the head and the thorax underneath the dense pubescence black; the sides of the face by the clypeus, the labrum, and base of the mandibles pale yellow, the apex of the mandibles castaneous brown; the flagellum of the antennæ light fuscous brown; the pubescence entirely pale fulvous; wings light flavo-hyaline.

Hab. Native Sikhim, above 8000 feet. ♂. *Length* 14; *exp.* 27 mm. ♀ unknown.

Genus ANTHOPHORA.

Podalirius, *Latr.* (*nec Lamarck*) *Hist. Nat. Ins.* iii, p. 378 (1802).
Anthophora, *Latr. Hist. Nat. Ins.* xiv, p. 45 (1804).

Type, *A. pilipes*, Fabr.
Range. Both hemispheres.

Head transverse, not quite so wide as the thorax; ocelli in an isosceles triangle on the vertex; antennæ short, the scape shorter than the 2nd joint of the flagellum; clypeus strongly produced and convex; labrum subquadrate, anterior margin widely rounded, nearly transverse; tongue elongate; labial palpi 4-jointed, the basal joint three times length of 2nd joint, apical two minute; maxillary palpi 6-jointed, basal joint short, 2nd joint the longest, 3–6 decreasing gradually in length, filiform. Thorax ovate; fore wing with the radial cell broad, rounded at apex and appendiculate, acute at the inner angle; three cubital cells, the 1st and 3rd subequal, the 2nd narrowed at top, sometimes pentagonal, receiving the 1st recurrent nervure in the middle; the 3rd cubital cell rounded outwardly and receiving the 2nd recurrent nervure near its apex; legs short, posterior tibiæ and basal joints of the tarsi in the female densely pubescent; intermediate tarsi in some species with tufts of hair on the apical joint above the claws. Abdomen broad, slightly ovate, sometimes densely pubescent, sometimes with only pubescent fasciæ on the apical margins of the segments.

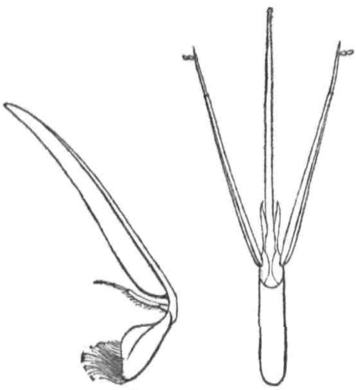

Fig. 178.—*Anthophora.* 1, maxilla; 2, labium. (Much enlarged.)

The species of *Anthophora* as a rule make their nests in the ground. I once found a whole colony of *A. cingulata*, Fabr., burrowing into the hard beaten earth under a forest bungalow in Burma.

Key to the Species.

A. Abdomen with distinct transverse pubescent fasciæ above.	
a. Basal abdominal segment without a fascia.	
a'. Abdominal segments 4 and 5 only with a fascia	*A. bicincta*, p. 525.
b'. Abdominal segments 2–5 with a fascia.	*A. crocea*, p. 526.
b. Basal abdominal segment with a fascia.	
a'. Fasciæ of metallic blue scale-like hairs.	
a^2. Pubescence on thorax above bluish grey	*A. cingulata*, p. 526.
b^2. Pubescence on thorax dull rufo-fulvous	*A. zonata*, p. 527.
b'. Fasciæ of white pubescence.	
a^2. Abdomen beneath ferruginous	*A. niveocincta*, p. 527.

b^2. Abdomen beneath black.
  a^3. Pubescence on thorax fulvous, or cinereous mixed with black hairs. *A. confusa*, p. 528.
  b^3. Pubescence on thorax ochraceous, often griseous .... *A. fallax*, p. 528.
c'. Fasciæ of rich fulvous, ferruginous or fulvous-white pubescence.
  a^2. Length 16–17 mm. .... *A. insularis*, p. 529.
  b^2. Length under 12 mm.
    a^3. Abdominal fasciæ fulvous white; length 10–12 mm. .... *A. quadrifasciata*, p. 529.
    b^3. Abdominal fasciæ rich fulvous; length 7–8 mm. .... *A. fraterna*, p. 529.
B. Abdomen without distinct transverse pubescent fasciæ above.
  a. Pubescence on abdomen quite or nearly unicolorous.
    a'. Thorax with grey pubescence above . *A. fimbriata*, p. 530.
    b'. Thorax with pale ochraceous, almost white pubescence above .... *A. candida*, p. 531.
    c'. Thorax with black or fuscous pubescence above .... *A. violacea*, p. 531.
    d'. Thorax with fulvous pubescence above .... *A. brookiæ*, p. 532.
  b. Pubescence on the abdomen markedly not unicolorous.
    a'. Basal two abdominal segments with fulvous, remaining segments with black pubescence .... *A. himalayensis*, p. 532.
    b'. Basal (basal two ♂) abdominal segments with pale ochraceous or pale golden yellow, remaining segments with flame-red (sometimes yellow) pubescence .... *A. pulcherrima*, p. 532.

922. **Anthophora bicincta.**

Apis bicincta, *Fabr. Syst. Ent.* ii, p. 338.
Podalirius bicinctus, *Dall. Torr. Cat.* x, p. 259.

♀. Head, thorax, and abdomen minutely and very densely punctured; clypeus somewhat flat, transverse, and margined anteriorly. Black; the base of the mandibles, the labrum, a broadish transverse submarginal line on the clypeus, another vertical medial line at right angles to it, and a transverse broadly triangular spot above its base pale creamy white; the apical margin of the 1st abdominal segment broadly, of the 2nd narrowly rufo-testaceous; the vertex of the head, the thorax above, the anterior legs entirely, the coxæ, femora, and tibiæ of the intermediate and posterior legs, and broad transverse bands on the apical margins of the 4th and 5th abdominal segments, with the sides of the apical segment, covered

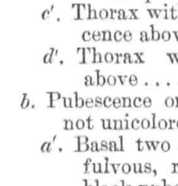

Fig. 179.—*Anthophora bicincta*, ♀. $\frac{1}{1}$.

with white pubescence; wings fusco-hyaline, paler towards the apical margins.

♂ similar; but the white parts on the clypeus broader, the pubescence slightly fulvous on the thorax, the 6th segment of the abdomen with a transverse pubescent white band on its apical margin; wings paler.

Var. ♀ ♂ with a pubescent white lateral spot on abdominal segments 2 and 3.

Hab. Allahabad; Calcutta; Bangalore; Madras. ♀. *Length* 12–13; *exp.* 24 mm. ♂ slightly smaller.

923. **Anthophora crocea,** n. sp.

♂. Head and thorax densely pubescent, finely and closely punctured, the scutellum more sparsely punctured; abdomen impunctate, the bases of the segments broadly and more or less densely pubescent, the apical margin of the first segment smooth and shining, of the 2nd to the 5th with broad pubescent bands. Black; the mandibles at base and the labrum pale yellow, the latter with an obscure fuscous spot at each basal lateral angle; clypeus darker yellow, with two divergent abbreviated black lines at base; a transverse triangular spot above the clypeus, and the front of the scape pale yellow; the head and thorax above with dense griseous pubescence; the pubescence on the anterior legs pale ochraceous, on the intermediate and posterior legs and abdomen jet-black; the apical margin of the 1st segment narrowly testaceous, of segments 2–5 with broad transverse bands of fine pale yellowish green scale-like hairs, 6th and apical segments with entirely black pubescence; wings fusco-hyaline.

Hab. Pegu Hills, Burma. ♂. *Length* 12; *exp.* 24 mm.

924. **Anthophora cingulata.**

Andrena cingulata, *Fabr. Syst. Ent.* p. 378.
Podalirius cingulatus, *Dall. Torr. Cat.* x, p. 263.

♀ ♂. Head and thorax densely, clypeus, face below the antennæ and the bases of the abdominal segments thinly pubescent, the head and thorax finely punctured underneath the pubescence; bases of the abdominal segments finely aciculate. Black; the labrum (except a lateral spot at base and the apical margin very narrowly), a spot at base of the mandibles, a subapical line on the clypeus, a medial line broadening from above downwards at right angles to the subapical line, and a small triangular spot above the base on each side of the clypeus, pale yellowish white; the head and thorax with bluish-grey pubescence having an admixture of black hairs; a tuft of white pubescence on each side of the median segment; the legs covered with bluish-white pubescence above, black beneath, the posterior tibiæ with long snow-white pubescence above and an abbreviated line of black pubescence above near its base; abdomen clothed with thin black pubescence, the apical margins of segments 1–4 (♀), 1–5 (♂) with broad trans-

verse bands of bright metallic blue scale-like hairs; antennæ black; wings light fusco-hyaline, nervures and tegulæ dark brown.

Hab. Sikhim; Pegu Hills, Burma; Tenasserim; Ceylon; the Malayan region to Australia. ♀ ♂. *Length* 14–15; *exp.* 25–26 mm.

925. **Anthophora zonata.** (Pl. IV, fig. 4.)

Apis zonata, *Linn. Syst. Nat.* (ed. 10) i, p. 576.
Anthophora subcærulea, *Lepel. Hym.* ii, p. 30, ♀ ♂.
Podalirius zonatus, *Dall. Torr. Cat.* x, p. 296.

♀. Head and thorax densely, clypeus and the bases of the abdominal segments thinly pubescent; the head and thorax finely and closely punctured under the pubescence, the bases broadly of the abdominal segments finely aciculate. Black; the labrum, base of the mandibles, sides and apical margin of clypeus, with a narrow medial line on the same, yellowish white; the labrum with a lateral spot and a line along its base black; a small transverse triangular spot above the base of the clypeus and the front of the scape of the antenna pale yellowish white; the front and vertex above the base of the antennæ, and the thorax above clothed with dull rufo-fulvous pubescence mixed with black hairs and with the apex of many of the other hairs black; legs covered with a thin cinereous pubescence; the cheeks behind the eyes, the head and thorax beneath, and the posterior tibiæ above with snow-white pubescence, the last with a short line of black hairs at base dividing the white; the pubescence on the abdomen black, the apical margins of segments 1–4 with transverse bands of metallic blue scale-like hairs; wings nearly clear hyaline, sometimes with a fulvous tint, nervures and tegulæ testaceous.

♂ similar; the clypeus entirely yellowish white with two divergent broad curved spots at base black.

Var. The bands on the abdomen not shining metallic blue, but dull and somewhat greyish.

Hab. Throughout India, Burma, Tenasserim, and Ceylon, extending through the Malay regions to Australia. ♀ ♂. *Length* 11–13; *exp.* 21–25 mm.

*926. **Anthophora niveo-cincta,** *Smith, Cat.* ii, p. 337, ♀.

? Andrena fasciata, *Fabr. Syst. Ent.* p. 377.
Podalirius niveocinctus, *Dall. Torr. Cat.* x, p. 279.

"♀. Length 5 lines (= about 11 mm.).—Black; a triangular spot above the clypeus, the clypeus, the face on each side, the labrum and mandibles, and a spot on the scape in front yellow; the clypeus has on each side at base an elongate quadrate spot, and its anterior margin narrowly black; the labrum has a fuscous spot on each side at base, the apex of the mandibles and the flagellum ferruginous; the pubescence on the face and cheeks white, on the vertex and disc of the thorax it is pale fulvous, the tips of the hairs being black; the pubescence on the sides of the thorax beneath, and also on the metathorax, white; the legs ferruginous above, densely covered with white pubescence, beneath it is black. Abdomen, the margins of the segments have a fascia of

white pubescence, the fifth is covered with the same, the apex fuscous; beneath the abdomen is ferruginous.

"*Hab.* India (*Smith*)."

Fabricius's *A. fasciata* so far as the description goes corresponds with the description of the above species, but I have failed to identify either *A. fasciata* or *A. niveo-cincta.*

927. **Anthophora confusa**, *Smith, Cat.* ii, p. 337, ♀.
? Anthophora vigilans, *Smith, 2nd Yark. Miss., Hym.* p. 6, ♂ (*nec Smith, Jour. Linn. Soc.* 1861, p. 92).
Podalirius confusus, *Dall. Torr. Cat.* x, p. 264.

♀. Head, thorax, and abdomen closely and finely punctured; head above and thorax densely pubescent. Black; the base of the mandibles, and the labrum, except a spot at each basal lateral angle, pale yellowish; clypeus black, a spot on each side, a transverse triangular spot above, and a medial comparatively broad line pale yellowish white, the margin also narrowly white in some specimens; pubescence on the vertex of the head and on the thorax above cinereous, sometimes fulvous, mixed with black hairs, on the cheeks and beneath and on the posterior femora behind white; legs with black pubescence, on the posterior tibiæ above snow-white, with an abbreviated black stripe at base; abdomen covered with a thin black pubescence, the apical margins of the basal four segments with fasciæ of white pubescence; wings fusco-hyaline.

♂ similar, smaller; the clypeus with broader yellow markings; the 5th abdominal segment with a transverse pubescent fascia on its apical margin.

Hab. Barrackpore; Sikhim; Bombay; Burma; Tenasserim; ? Ladák. ♀. *Length* 13–15; *exp.* 23–26 mm. ♂. *Length* 11–12; *exp.* 21–23 mm.

928. **Anthophora fallax**, *Smith, New Sp. Hym. B. M.* p. 120, ♀ ♂.
Anthophora lucknoviensis, *Rad. Wiadom. z nauk Przyrod.* 1882, ii, p. 76.
Podalirius fallax, *Dall. Torr. Cat.* x, p. 267.

♀. Head above on the vertex and the clypeus somewhat sparsely and finely punctured; the front, thorax, and transverse bands on the abdomen densely pubescent, the bases of the abdominal segments finely transversely aciculate. Black; the mandibles at base, labrum, and clypeus pale yellow, the last with two large contiguous quadrate maculæ at base; the front, the vertex, and thorax above with black-tipped ochraceous, very often griseous pubescence, that on the face below the antennæ, on the cheeks, and on the thorax beneath whitish; legs with griseous pubescence on the outside, black on the inside; abdominal segments 1–4 with a transverse pubescent white fascia on the apical margin, apical two segments with black pubescence; wings subhyaline, nervures brown, tegulæ testaceous.

♂ similar; the front of the scape of the antennæ yellow; the pubescence on the thorax darker ochraceous; abdominal segments 1–6 with transverse pubescent white fasciæ.

Hab. Western India; Allahabad; Burma; Tenasserim; Ceylon.

Beyond India in Southern and Western Africa. ♀ ♂. *Length* 8–10; *exp.* 17–21 mm.

929. **Anthophora insularis**, *Smith, Jour. Linn. Soc.* 1858, p. 48, ♀.
Podalirius insularis, *Dall. Torr. Cat.* x, p. 273.

♀. Head at the back, the cheeks, thorax, and abdomen densely pubescent, the pubescence long and erect on the thorax, short, scale-like, and pilose on the abdomen; the front and vertex of the head with a sparse covering of longish hairs, finely punctured beneath it; clypeus medially carinate. Black; the labrum except a narrow border all round, a ⊥-shaped mark on the clypeus, a transverse triangular spot above it, and the scape of the antennæ in front pale yellow; pubescence rich ferruginous, mixed with griseous and black on the head and thorax, the cheeks and the thorax beneath with white, and the posterior tibiæ and intermediate and posterior tarsi with jet-black pubescence; antennæ piceous; the bases of abdominal segments 2–4 and all the 5th and 6th black; wings flavo-hyaline, fuscescent towards the apical margins.

Hab. Burma; Tenasserim; Ceylon; Borneo, spreading down the Malay region. ♀. *Length* 16–17; *exp.* 30 mm. ♂ unknown.

930. **Anthophora quadrifasciata.**
Apis quadrifasciata, *Villers, Linn. Ent.* iii, p. 319.
Centris nidulans, *Fabr. Syst. Piez.* p. 357.
Podalirius quadrifasciatus, *Dall. Torr. Cat.* x, p. 284.

♀. Head, thorax, and abdomen more or less densely pubescent; the labrum, clypeus, front of the head, and the bases of the abdominal segments finely and closely punctured, the punctures shallow. Black; the head and front with cinereous, the thorax above and the outside of the posterior tibiæ with fulvous pubescence, paler on the tibiæ; the inside of the legs, the base of the basal four abdominal segments, and the whole of the 5th and 6th segments clothed with thin black pubescence, the apical margins of segments 1–4 broadly with pale fulvous-white pubescence; the labrum, the clypeus, and a transverse triangular spot above the latter pale yellowish white; a minute spot at each lateral basal angle of the labrum, and two large subquadrate contiguous spots at the base of the clypeus black; wings pale fusco-hyaline.

♂ similar; a whitish pubescent fascia on the 5th abdominal segment.

This is the common Indian form, but the species is very variable and the pubescence on the thorax may be any shade from fulvous to grey-blue, and the fasciæ on the abdominal segments are sometimes fulvous.

Hab. Spread from Central and Southern Europe, through Africa to India, Burma, and Ceylon. ♀ ♂. *Length* 10–12; *exp.* 19–22 mm.

931. **Anthophora fraterna**, n. sp.

♂. Head on the vertex somewhat coarsely, the thorax and

abdomen finely punctured; the front between and above the antennæ, the sides of the vertex, the thorax above and on the sides, the basal abdominal segment entirely, and transverse bands on the apical margins of segments 2–6 covered with more or less dense pubescence; legs long, with a thin fine pubescence on the outer side, the intermediate and posterior femora fringed with long hairs, and a brush-like tuft of coarser hairs beneath and spreading out laterally on the apical joint of the intermediate tarsi. Black; the pubescence rich fulvous, golden yellow on the front and pale on the posterior tibiæ, on the anterior and intermediate legs and on the apex of the tibiæ and tarsi of the posterior legs it is whitish; the tuft on the apical joint of the intermediate tarsi jet-black; the base of the mandibles and the labrum pale yellowish white; the clypeus and front of the scape of the antennæ sulphur-yellow; *wings hyaline and iridescent, nervures and tegulæ testaceous.*

Hab. Tenasserim. ♂. *Length* 7–8; *exp.* 15 mm. ♀ unknown.

932. **Anthophora fimbriata,** *Smith, New Sp. Hym. B. M.* p. 122, ♀.
Podalirius fimbriatus, *Dall. Torr. Cat.* x, p. 268.

♀. Head and thorax pubescent, closely and finely punctured under the pubescence, which on the clypeus and front below the antennæ is thin and sparse, and on the vertex of the head and on the thorax dense but not very long; abdomen smooth, dull, the surface minutely aciculate; clypeus strongly convex, transverse anteriorly and margined. Black; the base of the mandibles, the labrum (except the anterior margin and a large black spot on each side at its base), a spot at each lateral angle of the clypeus joined by a transverse line, an elongate cone-shaped median spot, and a transverse triangular spot above the base of the clypeus white; the front, vertex of the head, and thorax above with grey, the cheeks, the sides of the thorax in front, the anterior legs, and the median segment with white pubescence, thin and sparse on the legs, dense and long on the median segment; abdomen with a little black pubescence along the sides, and in fresh specimens with a little hoary pile on the apical two segments; intermediate and posterior legs with black pubescence, very dense and long on the outside of the posterior tibiæ and tarsi; wings dark fuscous, with a slight purple effulgence.

Fig. 180.
Anthophora fimbriata, ♀. 1.

♂ similar; the yellow-white on the labrum and clypeus broader, the legs longer, the wings paler, the apical three segments of the abdomen above with thin white pubescence.

Hab. Sylhet; Pegu Hills, Burma; Tenasserim. ♀. *Length* 18–20; *exp.* 36–39 mm. ♂. *Length* 16; *exp.* 34 mm.

933. **Anthophora candida,** *Smith, New Sp. Hym. B. M.* p. 122, ♀.
Podalirius candidus, *Dall. Torr. Cat.* x, p. 262.

♀. Head above the clypeus, the thorax and abdomen covered with dense short pubescence; the disc of the mesonotum under the pubescence closely and irregularly punctate-striate; clypeus and labrum bare, shining, punctured, the punctures fine and very shallow. Black; covered with dense short pale ochraceous pubescence; the extreme apex of the abdomen, the intermediate tibiæ and tarsi beneath, and the posterior tibiæ and tarsi above and below with jet-black pubescence, on the last forming a striking contrast to the ochraceous white of the pubescence on the femora; clypeus, labrum, and base of the mandibles pale yellowish white; two large maculæ at the base of the clypeus and a spot at the lateral basal angles of the labrum fuscous; the apical margin of the clypeus, and also of the labrum, and the apex of the mandibles ferruginous; antennæ piceous; in some specimens there is a broad longitudinal line of pale ferruginous pubescence along the middle of the posterior tibiæ above; wings vitreous or clear hyaline with a slight milky appearance.

♂ similar, smaller; the legs longer and more slender; the black spots on the clypeus nearly obsolete, no black pubescence at the apex of the abdomen.

Hab. The Punjab; Quetta; extending into Persia. ♀. *Length* 11; *exp.* 22 mm. ♂. *Length* 9; *exp.* 18 mm.

934. **Anthophora violacea,** *Lepel. Hym.* ii, p. 80, ♀ ♂.
Podalirius violaceus, *Dall. Torr. Cat.* x, p. 294.

♀. Clypeus and front below the anterior ocellus somewhat coarsely and closely, vertex of the head and the thorax above finely and densely punctured; abdomen smooth, the surface finely aciculate; clypeus convex, transverse and margined anteriorly, and bearing a medial shining carina. Black; the sides of the face, the vertex, the thorax, and median segment above, the legs, and sides of the thorax and of the abdomen covered with fuscous pubescence; on the median segment in some specimens there is an admixture of white hairs in the pubescence, giving it a greyish appearance; wings very dark fuscous, with a rich purple effulgence.

♂ similar; the clypeus not carinate, a spot on the mandibles at base, the labrum, and clypeus pale creamy white; the anterior, lateral, and basal margins, and the basal angles of the labrum, the anterior margin narrowly of the clypeus, and a broad, somewhat irregular Λ-shaped mark on its disc black; antennæ piceous; posterior margins of the abdominal segments rufo-testaceous; wings much paler than in the ♀.

Hab. Bengal; N.W. Provinces; Delhi; Bombay; Central India; Bangalore; Madras; Ceylon. ♀. *Length* 17–18; *exp.* 35 mm. ♂. *Length* 16; *exp.* 32 mm.

935. **Anthophora brookiæ,** *Bingh. Jour. Bomb. N. H. Soc.* v, 1890, p. 250, ♀.

♀. Head, thorax, and abdomen finely and closely punctured and pubescent, the pubescence dense and somewhat long on the head and thorax above, very sparse on the clypeus and front, and very short, fine, pile-like, and thin on the abdomen; clypeus strongly convex, and with a short median longitudinal carina. Black; the base of the mandibles, the labrum, clypeus, and a transverse broadly triangular spot above it pale yellow; the anterior margin and a lateral basal spot on the labrum, and two large quadrate maculæ at the base of the clypeus black; the vertex of the head, the cheeks, and the thorax above with rich fulvous pubescence; the thin pile on the abdomen and the pubescence on the outside of the legs pale fulvous in some specimens, fading to white on the apical margins of the abdominal segments; the pubescence on the inside of the legs and the antennæ black: wings hyaline, fusco-hyaline in some specimens; nervures and tegulæ testaceous.

Hab. Kumaun; Karennee, 3000 feet. ♀. *Length* 15–16; *exp* 28 mm.

936. **Anthophora himalayensis,** *Rad. Wiadom. z nauk Przyrod.* 1882, pt. ii, p. 74; *Dall. Torr. Cat.* x, p. 272.

♀. Head above and the cheeks, the thorax, and the legs exteriorly densely pubescent, the pubescence on the front and clypeus thin and scanty; the clypeus closely punctured anteriorly, margined, and bearing a medial vertical carina very smooth and shining: basal two abdominal segments covered with a dense short pubescence, apical four segments pruinose velvety; inside of the femora and tibiæ smooth and shining, without pubescence. Head and thorax under the pubescence fulvous, the pubescence rich fulvous; legs and abdomen black, the pubescence on the legs outside and on the basal two abdominal segments rich fulvous; antennæ testaceous; wings flavo-hyaline, their apical margins broadly fuscescent.

♂ similar; legs longer and more slender, antennæ longer; wings more suffused with a fuscescent shade.

Hab. The Himalayas, from Simla to Sikhim, at low elevations; the hills of Burma and Tenasserim. Common. ♀ ♂. *Length* 16–18; *exp.* 32–35 mm.

937. **Anthophora pulcherrima,** n. sp. (Pl. IV, fig. 5.)

♀. Head, thorax, and abdomen pubescent, finely punctured under the pubescence; abdomen broader and flatter than in the majority of species. Black; the front and vertex of the head, the thorax above, the posterior tibiæ on the outside, and the basal abdominal segment covered with pale golden yellow, the remaining abdominal segments above with rich flame-red pubescence; the pubescence on the thorax and abdomen long, soft, and silky, on

the labrum and front of the face erect and stiff; legs for the most part with pale ochraceous, and the thorax beneath with white pubescence; mandibles, clypeus, labrum, and antennæ black: wings hyaline, slightly fuscescent and iridescent towards the apex; nervures and tegulæ dark brown.

♂ similar, smaller; the labrum and clypeus pale yellow; the pubescence on the head, thorax, legs, and basal two abdominal segments pale ochraceous.

Var. The pubescence much paler, that on the apical three abdominal segments golden yellow, not red.

Hab. Sikhim. ♀. *Length* 14; *exp.* 27 mm. ♂. *Length* 12; *exp.* 22 mm.*

Genus **XYLOCOPA**.

Xylocopa, *Latr. Hist. Nat. Ins.* iii, p. 379 (1802).
Mesotricha, *Westw. Trans. Ent. Soc.* ii, p. 112 (1837).
Platynopoda, *Westw. Nat. Libr., Ins.* vii, p. 271 (1840).

Type, *X. violacea*, Fabr.

Range. Both hemispheres.

Head transverse, subrotund; ocelli in a triangle just below the vertex; eyes larger in the male and more closely approximate at vertex than in the female; antennæ geniculate, the scape sometimes dilated or incrassate; the flagellum cylindrical, apical joint obliquely truncate; mandibles short, stout, grooved exteriorly, the apex with two, sometimes three teeth; maxillary palpi † 6-jointed, basal three joints thick, long, apical three slender and short, each in succession decreasing in length; labial palpi 4-jointed, basal joint nearly five times the length of the 2nd joint, apical two minute, inserted in a line with the other joints. Thorax short; fore

* The following species described by the late General Radoszkowski in a Polish work I have not been able to identify:—

"ANTHOPHORA FADDEI.

"Nigra; clypeo dense punctato linea elevata longitudinali, labro rugoso; capite, thorace antice, sub alis albo-villosis; abdominis segmentis quatuor anticis niveo-fasciatis, fasciis omnibus latissime interruptis, pedibus nigro-hirsutis.—Alis fortiter fumatis. Femina. Long. 16 mm. Pichpek" (? Himalayas).

"ANTHOPHORA INDICA.

"Nigra; clypeo, labroque eburneis nigro-maculatis, mandibulis eburneo-maculatis; abdominis segmentis 1-5 utrinque niveo-maculatis, pedibus nigro-hirsutis.—Alis fortiter fumatis. Mas. Long. 13 mm. India."

"ANTHOPHORA NUDA.

"Nigra; clypeo stramineo nigro-maculato; antennis subtus cinnamomeis, labro stramineo-villoso, thorace lutescenti-villoso; abdominis segmentis 1-2 nudis, luteo-ferrugineis, omnibus stramineo-fasciatis, pedes ochracei lutescenti-villosi.—Alis subfuscis. Fem. Long. 14 mm. Himalayas."
Rad. Wiadom. z nauk Przyrod., Warszawa, ii, 1882, pp. 74–75.

† The head from the front, the maxilla, and labium are figured in the Introduction.

wing with the radial cell elongate, acute at apex; three cubital cells, the 3rd longest, 2nd subtriangular, the inner angle produced; the 1st recurrent nervure interstitial with the 2nd transverse cubital nervure, the 3rd cubital cell receives the 2nd recurrent nervure about the middle; anterior and intermediate tibiæ with one apical spur, flat and obliquely truncate at apex on the anterior tibiæ;

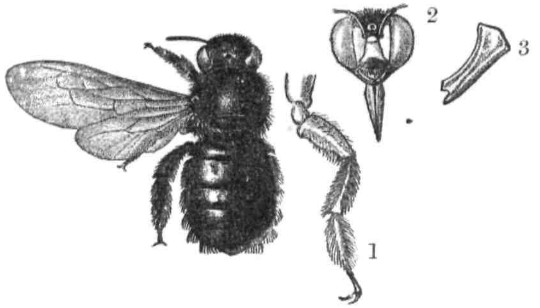

Fig. 181.
Xylocopa dissimilis, ♀. $\frac{1}{1}$. ♂. 1, posterior leg; 2, face from front; 3, mandible.

posterior tibiæ and tarsi always densely pubescent, the former with two simple spines at apex; legs of male generally elongate, the posterior femora sometimes curved and subdentate below. Abdomen either elongate or broad and flat, fringed with long hairs on the sides of the segments.

Several species of *Xylocopa* are among the commonest insects in India and Burma, often coming into houses with a loud buzzing: in thatched houses they frequently bore into the bamboos laid below the thatch, cutting neat round holes as entrances to their nests. Their jaws must be very powerful, as I have seen the iron-wood posts in the veranda of a house in Burma riddled with the holes made by *X. latipes*; the insects were going in and out all day long with pollen. *X. rufescens* is crepuscular, on fine moonlight nights its loud buzzing can be often heard all night long. The males of all the species generally poise themselves on the most conspicuous point of a branch, awaiting the females.

Key to the Species.

Females.

A. With black or sooty-brown pubescence.
  a. Length 30 mm. and over.
    a'. Scape of antennæ distinctly flattened and broad at apex .... *X. latipes*, p. 536.
    b'. Scape of antennæ cylindrical ...... *X. tenuiscapa*, p. 537.
  b. Length under 30 mm.
    a'. Wings fuscous with rich coppery bronze effulgence, not blue or green.

a^2. Abdomen very convex, nearly as broad as long .... *X. acutipennis*, p. 537.
b^2. Abdomen not so convex, long and narrow, only about two-thirds as broad as long .... *X. pictifrons*, p. 538.
b'. Wings fuscous purple at base with reddish coppery effulgence, turning to metallic green at apex.
a^2. Length 23–24 mm. .... *X. auripennis*, p. 538.
b^2. Length 27–29 mm. .... *X. dissimilis*, p. 538.
c'. Wings fuscous with dull purple effulgence throughout.
a^2. Abdomen obscure bottle-green .. *X. nigrocærulea*, p. 539.
b^2. Abdomen black.
a^3. Length 22–24 mm. .... *X. fenestrata*, p. 539.
b^3. Length 13–17 mm. .... *X. amethystina*, p. 540.
d'. Wings fuscous, deep metallic blue at base, then metallic green, followed by deep rosy coppery red at apex .. *X. iridipennis*, p. 540.

B. With yellow and black pubescence.
a. Thorax only with yellow pubescence above .... *X. æstuans*, p. 540.
b. Occiput, thorax, sometimes also basal abdominal segment, with yellow pubescence.
a'. Yellow pubescence spreading to sides of thorax under the wings .... *X. verticalis*, p. 541.
b'. Yellow pubescence not spreading to sides of thorax .... *X. bryorum*, p. 541.

C. With black and white pubescence.
a. Clypeus, front, and face with dense cinereous white pubescence .... *X. basalis*, p. 542.
b. Clypeus, front, and face without or with fuscous or black pubescence.
a'. Abdomen with white pubescent bands .... *X. albofasciata*, p. 542.
b'. Abdomen with entirely black pubescence .... *X. collaris*, p. 543.

D. With golden brown, sometimes rufescent pubescence .... *X. rufescens*, p. 543.

E. With blue and black pubescence ...... *X. cærulea*, p. 544.

Males.

A. With black or sooty-brown pubescence.
a. Length 30 mm. and over.
a'. Scape of antennæ flattened and very broad at apex .... *X. latipes*, p. 536.
b'. Scape of antennæ cylindrical, only slightly incrassate .... *X. tenuiscapa*, p. 537
b. Length under 30 mm.
a'. Wings fuscous with a rich coppery bronze effulgence, not blue or green.
a^2. Anterior and intermediate tibiæ and tarsi with pale golden pubescence .... *X. acutipennis*, p. 537.

b^2. Anterior and intermediate tibiæ and tarsi with black pubescence .	*X. pictifrons*, p. 538.
b'. Wings fuscous, purplish at base, with reddish coppery effulgence, turning to metallic green at apex.	
a^2. Length 20–21 mm.	*X. auripennis*, p. 538.
b^2. Length 25–27 mm.	*X. dissimilis*, p. 538.
c'. Wings fuscous with dull purple effulgence throughout.	
a^2. Length 21–22 mm.	*X. fenestrata*, p. 539.
b^2. Length 12–14 mm.	*X. amethystina*, p. 540.
d'. Wings fuscous, deep metallic blue at base, then metallic green followed by deep rosy coppery red at apex ..	*X. iridipennis*, p. 540.
B. With olive-yellow pubescence.	
a. Posterior tarsi only with brownish pubescence. Length 18–20 mm.	*X. æstuans*, p. 540.
b. All the legs with reddish-yellow pubescence. Length 19–22 mm.	*X. verticalis*, p. 541.
c. Intermediate and posterior tibiæ and tarsi with dark fuscous-brown pubescence. Length 21–23 mm.	*X. bryorum*, p. 541.
d. All the legs with fuscous-brown pubescence, the anterior and intermediate tibiæ and tarsi fringed with pale pubescence. Length 24–25 mm.	*X. flavonigrescens*, p. 544.
C. With black and white or black and ochreous pubescence.	
a. Face and front black, covered with dense white pubescence, fulvous on the clypeus	*X. basalis*, p. 542.
b. Face and front more or less yellow, with a little pale ochreous pubescence	*X. collaris*, p. 543.
D. With golden-brown pubescence	*X. rufescens*, p. 543.
E. With blue and black pubescence	*X. cærulea*, p. 544.

938. **Xylocopa latipes.** (Pl. IV, fig. 7.)

Apis latipes, *Drury, Ill. Exot. Ins.* ii, pl. 48, fig. 2.
Xylocopa latipes, *Fabr. Syst. Piez.* p. 337; *Smith, Cat.* ii, p. 353; *Dall. Torr. Cat.* x, p. 213.

♀. Head, thorax, and abdomen punctured; the clypeus, mesonotum anteriorly, and abdomen most densely so; front with two deep sulcations from below the base of the antennæ to beyond the posterior ocelli, the division between forming a marked ridge and widening above to receive the anterior ocellus; scape of the antennæ widened towards apex. Black, with black pubescence, thick and velvety on the mesonotum anteriorly, and long and tufted on the lateral margins of the abdominal segments; the pubescence on the posterior tibiæ long, dense, and stiff; wings dark fuscous, with vivid coppery, green, and purple effulgence changing as they catch the light.

♂ similar, the sulcations on the front smaller; the eyes very large, meeting or nearly meeting on the vertex; scape of the antennæ much broadened towards the apex; anterior tibiæ and

tarsi flattened and yellow, the tibiæ twisted, the tibiæ and tarsi fringed anteriorly and posteriorly with long, thick, somewhat curled hairs; intermediate and posterior legs longer in proportion; wings much narrower, the apex of the anterior wing acute. Some specimens have the clypeus and face below the antennæ variegated with yellowish white.

Hab. Sikhim; Barrackpore; Kumaun Terai; Central India; Malabar; Coonoor; Assam; Burma; Tenasserim; extending to China and the Malayan region. ♀ ♂. *Length* 32–35; *exp.* 78–80 mm.

939. **Xylocopa tenuiscapa,** *Westw. Jard. Nat. Lib., Ent.* vii, p. 271, pl. 23, fig. 2, ♂; *Smith, Cat.* ii, p. 353; *Dall. Torr. Cat.* x, p. 219.

Xylocopa viridipennis, *Lepel. Hym.* ii, p. 205.

♀ ♂. Closely allied to and resembling *X. latipes*: the female differs in being on the whole smaller; the sulcations on the front not extending up to the ocelli, the scape of the antennæ not at all dilated at apex, and the abdomen on the whole less densely punctured. The male differs from that of *X. latipes* in the scape of the antennæ being cylindrical.

Hab. Madras; Assam; Burma; Ceylon. ♀. *Length* 30–32; *exp.* 64–70 mm. ♂. *Length* 30; *exp.* 68 mm.

940. **Xylocopa acutipennis,** *Smith, Cat.* ii, p. 355, ♂; *Dall. Torr. Cat.* x, p. 202.

♀. Head somewhat sparsely punctured; thorax nearly smooth, with a few very fine scattered punctures along the front and sides of the mesonotum and sides of the scutellum; abdomen finely and densely punctured; clypeus nearly flat, subtriangular, its sides and the front between the base of the antennæ raised into a broad Λ-shaped carina. Black; the front above the antennæ and the mesonotum anteriorly with short dense velvety sooty-brown pubescence; the sides of the thorax, the legs, and the sides of the abdomen with black pubescence; wings narrow and somewhat acute, fuscous with rich metallic coppery, bronze, almost golden tints in certain lights.

♂. The mesonotum and scutellum more punctured, the punctures very shallow and fine, the disc of the former smooth and shining. Black; the clypeus, a spot at the base of the mandibles, and the scape of the antennæ pale whitish yellow; the pubescence as in the female, with the exception of the anterior tibiæ and tarsi and the intermediate tarsi posteriorly, which are clothed with a pale golden pubescence; wings in the type fuscous, with purple and greenish effulgence, more often, however, as in the female but paler, with the golden metallic tints brighter; the fore wing more acute at apex than in the female.

Hab. Sylhet; Khási Hills; Sikhim; Taoo plateau, 4000 ft., Tenasserim. ♀. *Length* 26; *exp.* 60 mm. ♂. *Length* 23–24; *exp.* 56–58 mm.

941. **Xylocopa pictifrons**, *Smith, Trans. Ent. Soc.* n. s. ii (1852), p. 42, ♀; *Dall. Torr. Cat.* x, p. 217.

♀. Head, thorax (except the disc of the mesonotum and the base of the scutellum) finely and closely, abdomen very sparsely punctured; the mesonotum anteriorly and the apical 3 or 4 segments of the abdomen more or less densely pubescent; the anterior margin of the clypeus somewhat broadly smooth, shining and impunctate, broadly emarginate in the middle, oblique at the sides; thorax more or less globose and rounded posteriorly. Jet-black and shining, with black pubescence; wings brown, with rich coppery and golden tints, purplish or rosy in different lights; in the typical specimens from China more or less hyaline towards the base.

♂ similar, narrower, with longer legs; the clypeus (except its anterior margin) narrowly, the face on each side to the level of the posterior ocelli, the front below the base of the antennæ, and a lunule on each side of the anterior ocellus bright yellow; the pubescence on the thorax anteriorly and on the sides and back of the median segment sooty brown, on the sides of the thorax anteriorly and on the tubercles brownish white; wings narrower than in the female, with more of a greenish brassy lustre.

Hab. China; Java; Sikhim; Kumaun. ♀. *Length* 21–23; *exp.* 48–52 mm. ♂. *Length* 21; *exp.* 46 mm.

This beautiful species I found very common at Gnatong in Native Sikhim, 12,500 feet. The male attributed to it by Smith belongs, I am certain, to some other species.

942. **Xylocopa auripennis**, *Lepel. Hym.* ii, p. 181, ♀ ♂; *Smith, Cat.* ii, p. 356; *Dall. Torr. Cat.* p. 205.

♀. Head densely and finely, thorax and abdomen more sparsely punctured; the disc of the mesonotum impunctate, smooth and polished; clypeus with an obscure T-shaped impunctate mark, and a broad carina above it between the bases of the antennæ, the carina bifurcating below and circling round the anterior ocellus. Black; the pubescence black, slightly sooty brown and velvety in fresh fine specimens on the mesonotum anteriorly; wings very dark brown, with the most brilliant effulgence of any of the Oriental species of *Xylocopa*, metallic greenish-blue at base, changing to vivid green with rich golden tints in certain lights towards the apical margins.

♂ similar; differs in being narrower and longer proportionately, the posterior femora incrassate with an obscure tooth below.

Hab. Sikhim; Barrackpore; Calcutta; Burma; Tenasserim; China. ♀. *Length* 23–25; *exp.* 50–53 mm. ♂. *Length* 20–21; *exp.* 50 mm.

943. **Xylocopa dissimilis**, *Lepel. Hym.* ii, p. 180, ♀ ♂; *Smith, Cat.* ii, p. 356; *Dall. Torr. Cat.* x, p. 209.

♀. Head densely, thorax and abdomen sparsely punctured; the obscure impunctate mark and the frontal carina as in *X. auri-*

pennis, but not so prominent. Black, with black pubescence, very dense on the mesonotum anteriorly, on the sides of the thorax beneath the wings, the postscutellum, and on the legs; wings purple at base with reddish coppery tints, becoming metallic green towards the apical margins.

♂ similar, the legs longer, the posterior femora incrassate, the posterior tibiæ with a broad lamellate projection at apex beneath; the clypeus at base sometimes, the sides of the face, and a lunular mark on each side of the anterior ocellus whitish yellow; the thorax anteriorly with a band of whitish-brown pubescence.

Hab. North-West Provinces; Sikhim; Barrackpore: Burma; Tenasserim; Ceylon. ♀. *Length* 27–29; *exp.* 68 mm. ♂. *Length* 25–27; *exp.* 60–64 mm.

This species resembles *X. auripennis*, but it is larger, and the male is easily distinguished by the yellow lunule on each side of the anterior ocellus.

944. **Xylocopa nigrocærulea**, *Smith, Trans. Ent. Soc.* 1874, p. 279, ♀; *Dall. Torr. Cat.* x, p. 215.

♀. Head, thorax, and abdomen opaque, densely and finely punctured all over, even on the disc of the mesonotum; clypeus obscurely medially carinate, the carina continued up the front to the anterior ocellus, most prominent between the antennæ. Head and thorax dull black; abdomen deep obscure bottle-green; pubescence black, dark sooty brown on the mesonotum anteriorly; wings light fuscous brown with a slight purplish lustre, and somewhat paler, almost subhyaline on the disc.

Hab. Celebes; Ceylon. ♀. *Length* 22; *exp.* 48 mm.

945. **Xylocopa fenestrata.**

Apis fenestrata, *Fabr. Ent. Syst. Suppl.* p. 273, ♂.
Xylocopa indica, *Klug, Mag. n. Entd. ges. Naturk., Berlin*, i, 1807, p. 264.
? Xylocopa lunata, *Klug, t. c.* p. 264, t. vii, fig. 2, ♀ var.

♀. Head finely and closely, thorax and abdomen more sparsely punctured, the disc of the mesonotum impunctate; clypeus very slightly convex, nearly flat, widely emarginate anteriorly; front not carinate; mesonotum with three obscure, parallel, longitudinally impressed abbreviated lines. Black, shining, the pubescence black, ferruginous along the apex of the anal abdominal segment, sparse except on the intermediate and posterior legs, where it is dense, long, and of a sooty-black colour; third abdominal segment with, sometimes, a minute spiracular lateral impression near its base covered with short yellow pubescence; wings dark fuscous, with a purple and coppery effulgence, and with obscure hyaline lines between the nervures at base.

♂ similar, narrower in shape, the wings paler, with the hyaline lines more clearly defined.

Hab. Throughout India, most plentiful in the North-West

Provinces; Burma; Tenasserim; Ceylon; Celebes. ♀. *Length* 22–24; *exp.* 46–50 mm. ♂. *Length* 21–22; *exp.* 44 mm.

946. **Xylocopa amethystina**, *Fabr. Ent. Syst.* ii, p. 325; *Dall. Torr. Cat.* x, p. 204.
Xylocopa minuta, *Lepel. Hym.* ii, p. 190.
Xylocopa ignita, *Smith, Trans. Ent. Soc.* 1874, p. 276.

♀. Head and thorax anteriorly, and on the sides and apex of the mesonotum finely and closely, abdomen sparsely punctured, the last with long soft thin pubescence on the apical three or four segments; clypeus medially obscurely carinate; front between the antennæ with a small but acute and prominent tubercle. Black with black pubescence; wings fuscous, with a deep purple lustre.

♂ similar, smaller; the clypeus and sides of the face and apex of the labrum yellowish white; the pubescence on the mesonotum anteriorly, on the sides of the thorax in front, and on the anterior tibiæ and tarsi pale brown, almost cinereous on the tarsi; wings paler than in the female, in some specimens hyaline at base.

Hab. Punjab; North-West Provinces; Kumaun; Bombay; Malabar; Ceylon. ♀. *Length* 13–17; *exp.* 37–39 mm. ♂. *Length* 12–14; *exp.* 29–32 mm.

947. **Xylocopa iridipennis**, *Lepel. Hym.* ii, p. 188, ♀; *Smith, Cat.* ii, p. 353; *Dall. Torr. Cat.* x, p. 213.
? Xylocopa chloroptera, *Horne* (*nec Lepel.*), *Trans. Zool. Soc.* vii, 1870, p. 179.

♀ ♂. Closely resembling *X. dissimilis*, but longer and narrower in both sexes, the puncturings on the head, thorax, and abdomen, especially on the last, finer, closer and deeper; the male with the front entirely black, and with no lateral yellow lunules; the pubescence on the sides of the abdomen longer and more dense than in *X. dissimilis*. The wings are very different, being deep metallic blue at base, turning to greenish and deep rosy coppery red towards the apex of the fore wing.

Var. A line on the pronotum above and the tubercles covered with light brown pubescence.

Hab. North-West Provinces; Bengal; Madras; Bangalore; Burma; Tenasserim; Sumatra; China. ♀ ♂. *Length* 25–27; *exp.* 66–69 mm.

I am not quite certain whether I have identified this species correctly. The above description is taken from specimens in the British Museum, probably labelled by the late Mr. F. Smith.

948. **Xylocopa æstuans.**
Apis æstuans, *Linn. Syst. Nat.* i, ed. x, p. 579, ♀.
Xylocopa æstuans, *Lepel. Hym.* ii, p. 193, ♀ ♂; *Smith, Cat.* ii, p. 353; *Dall. Torr. Cat.* x, p. 202.

♀. Head, thorax, and abdomen finely punctured, the thorax above densely pubescent, the disc of the mesonotum smooth and impunctate under the pubescence; clypeus flat, transverse in

the middle anteriorly, the sides oblique; clypeus and front not carinate. Black; the pubescence on the head and face, on the sides of the thorax and beneath, and on the abdomen black: on the thorax above it is bright yellow; wings dark fuscous with a purple effulgence.

♂. Black, covered all over with a dense olive-yellow pubescence, darker or paler according to locality, those from Sikhim, Burma, and Tenasserim being darker than specimens from the Punjab, N.W. Provinces, and Bombay: posterior tarsi with brown pubescence; wings hyaline.

Hab. Throughout India, Assam, Tenasserim; Burma; Ceylon; extending to Africa on the west and to the Malayan region on the east. ♀. *Length* 21–23; *exp.* 41–48 mm. ♂. *Length* 18–20; *exp.* 40–42 mm.

949. **Xylocopa verticalis**, *Lepel. Hym.* ii, p. 195, ♀ ♂; *Dall. Torr. Cat.* x, p. 219.

♀ ♂. Somewhat like the two sexes respectively in *X. æstuans*: the female, however, a more compact insect, with the thorax more globular; the cheeks, occiput, the thorax above and on the sides, and the basal abdominal segment covered with dense yellow pubescence having a soft velvety appearance; legs with a sooty-brown pubescence, turning to ferruginous on the inside of all the tarsi; wings fuscous with a purplish effulgence, subhyaline at base.

♂ differs from *X. æstuans* ♂ only in having the legs covered with a rich reddish-yellow, instead of an olive, pubescence.

Hab. Barrackpore. ♀. *Length* 19–24; *exp.* 44–48 mm. ♂ slightly smaller.

950. **Xylocopa bryorum** *.

Apis bryorum, *Fabr. Syst. Ent.* p. 381.
Xylocopa bryorum, *Smith, Trans. Ent. Soc.* 1874, p. 275; *Dall. Torr. Cat.* x, p. 206.

♀. Very closely resembling *X. æstuans*, but constantly larger, the abdomen more closely punctured, the yellow pubescence of the thorax spreading on to the back of the head and cheeks, and sometimes to the basal abdominal segment: wings variable, but in the majority of specimens lighter in colour.

♂ also larger than *X. æstuans* ♂, the pubescence a darker olive than in that species; the inside of the intermediate and

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* Smith in Jour. Linn. Soc. 1864, p. 48, describes, from Mysol, Waigiou, &c., a *Xylocopa provida*, the female of which apparently differs from the female of *X. æstuans* in having the thorax only posteriorly covered with yellow pubescence. In the Trans. Ent. Soc. 1874, p. 274, Smith adds N. India to the localities from which it has been obtained. In the British Museum collection there are, however, only three specimens, all males, of this species, and all are from the Malayan region. So far as these specimrns are concerned, I can see no differenee between them and the males of *X. bryorum*.

posterior tibiæ and tarsi with fuscous dark brown pubescence; wings hyaline or fusco-hyaline with a purple effulgence.

Hab. Sikhim; Malabar; Ceylon; South Tenasserim; through the Malayan region to Australia. ♀. *Length* 24–27; *exp.* 45–50 mm. ♂. *Length* 21–23; *exp.* 45–48 mm.

The two species, *X. æstuans* and *X. bryorum*, are so closely allied that I would join them were it not that the distribution of the two forms is not exactly conterminous. In Tenasserim *X. bryorum* occurs commonly about Tavoy and Mergui, but not to the north.

951. **Xylocopa basalis,** *Smith, Cat.* ii, p. 355, ♀ ♂; *Dall. Torr. Cat.* x, p. 205.

♀. Head, thorax, and abdomen finely and somewhat sparsely punctured, the punctures most dense on the cheeks, on the sides of the vertex, and sides of the abdominal segments above, the disc of the mesonotum, base of scutellum, base and apex of 1st abdominal segment and the apices narrowly in the middle of the remaining segments impunctate, smooth and shining; sides of the face and front to just below the vertex depressed, the margin of the depression sharp, transverse; a sharp tubercle below the anterior ocellus. Black; the clypeus, the face, and front to the margin of the depressed portion covered densely with cinereous white pubescence; the lateral margins of the basal three abdominal segments and the lateral and apical margins of the remaining segments fringed with long pale yellowish-white pubescence; antennæ bright piceous brown; the intermediate and posterior tibiæ and tarsi with rufo-fuscous pubescence; wings fuscous with a light purplish lustre, basal half hyaline.

♂ similar; the pubescence on the clypeus fulvous, a tuft of white pubescence on the tubercles; the basal joint of the posterior tarsi incrassate, and with a little white pubescence near the apex of the tibiæ.

Hab. Northern India. ♀ ♂. *Length* 15–19; *exp.* 34–36 mm.

*952. **Xylocopa albofasciata,** *Sich. Novara-Reise, Hym.* p. 154, ♀; *Dall. Torr. Cat.* x, p. 204.

"♀. Head black, punctured, with sparse black pubescence; antennæ beneath fuscous; mandibles bidentate; clypeus medially subcarinate; eyes not convergent at vertex. Thorax black, with black pubescence, deeply but sparsely punctured; scutellum margined posteriorly, emarginate in the middle, metathorax (median segment) abruptly truncate. Abdomen black, non-pubescent, opaque, but densely and strongly punctured; base of 1st segment truncate; segments 2–5 with a dense long fimbria of pubescence on each side; segments 1–5 with a narrow basal fascia of short white pile. Anal segment and abdomen beneath black, with black pubescence. Legs black, with black pubescence. Wings fuscous, subhyaline, with green and pale coppery and golden lustre; nervures fuscous. *Length* 35; *wing* 26 mm.

"*Hab.* Ceylon."

953. **Xylocopa collaris,** *Lepel. Hym.* ii, p. 189, ♀; *Smith, Cat.* ii, p. 353; *Dall. Torr. Cat.* x, p. 208.
Xylocopa dejeanii, *Lepel. Hym.* ii, p. 209, ♂.

♀. Head, thorax, and abdomen punctured, very finely and closely on the head and abdomen, less closely on the disc of the mesonotum and on the scutellum; a distinct fine medial vertical carina from the apex of the clypeus to between the base of the antennæ, continued as a furrow to the anterior ocellus. Black, with black pubescence; the pronotum, the sides of the thorax anteriorly, and the front of the mesonotum clothed with erect dense white pubescence; wings dull fuscous, with a moderate purple effulgence.

♂. The frontal carina abbreviated, not coming below the base of the clypeus. Black; the clypeus, sides of the face, the front below the anterior ocellus, a broad line by the eyes over the vertex, and the scape of the antennæ pale yellowish white; the pubescence on the vertex, the pronotum, sides of the thorax anteriorly, front of the mesonotum, anterior legs, and the basal one or two segments of the abdomen ochraceous; wings subhyaline, lightly fuscous with purple effulgence.

Var. The whole thorax covered with ochraceous pubescence; in some specimens the 3rd abdominal segment also covered with a thin ochraceous down; very variable in size.

Hab. Sikhim; Allahabad; Kumaun; Burma; Tenasserim; Ceylon; extending into the Malayan region and Siam. ♀. *Length* 18–19; *exp.* 40–42 mm. ♂. *Length* 14–19; *exp.* 32–44 mm.

954. **Xylocopa rufescens,** *Smith, Trans. Ent. Soc.* 1874, p. 271, ♀; *Bingh. Jour. Bomb. N. H. Soc.* viii, 1893, p. 388, pl. i, fig. 2; *Dall. Torr. Cat.* x, p. 217.

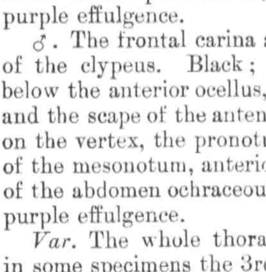

Fig. 182.
Xylocopa rufescens, ♂. ½.

♀. Head, thorax, and abdomen more or less densely pubescent and finely and closely punctured under the pubescence. Rufo-fuscous, with golden-brown pubescence varying in depth of colour and brightness; antennæ rufous brown, the flagellum paler beneath; wings fulvo-hyaline, paler along the apical and posterior margins.

♂ similar, with the pubescence paler but brighter and more dense on the abdomen; the clypeus and face yellow *.

Hab. Sikhim; Burma; Tenasserim; Java, Sumatra, Borneo. ♀ ♂. *Length* 28–30; *exp.* 57–60 mm.

* The following species, described by Lepeletier St.-Fargeau from India, I have been wholly unable to identify; so far as I know, it has not been procured of late years, and may not be Indian:—

Xylocopa ferruginea.—"Antennæ nigræ. Caput et thorax nigra, nigro villosa. Abdomen nigrum, totum ferrugineo subvillosum margineque ciliatum.

955. **Xylocopa cærulea.** (Pl. IV, fig. 8.)
Bombus cæruleus, *Fabr. Syst. Piez.* p. 345.
Xylocopa cærulea, *Lepel. Hym.* ii, p. 200; *Smith, Cat.* ii, p. 357; *Dall. Torr. Cat.* x, p. 207.

♀ ♂. Head, thorax, and basal abdominal segment densely pubescent, and punctured finely and closely under the pubescence, except on the disc of the mesonotum which is smooth. Black; the intermediate and posterior legs and the sides of the apical five abdominal segments with black pubescence; the head, thorax, and anterior tibiæ with a beautiful blue pubescence; the pubescence on the anterior tarsi black; wings dark fuscous with a purple effulgence.

Hab. Sikhim; Burma; Tenasserim; extending as far as New Caledonia. ♀. *Length* 17–19; *exp.* 38–40 mm. I have not see the male.

956. **Xylocopa flavonigrescens**, *Smith, Cat.* ii, p. 354, ♂; *Dall. Torr. Cat.* x, p. 211.

♂. Head and thorax densely, abdomen sparsely pubescent, the last very finely, closely, and regularly punctured; the clypeus, face in front, vertex of the head, thorax, and basal abdominal segment above with bright yellow pubescence; the cheeks behind the eyes, the 2nd and following segments of the abdomen with black pubescence, having an obscure olive tinge on segments 2–4; a very narrow line of bright yellow pubescence slightly interrupted in the middle at the bases of the 4th, 5th, and 6th segments, and the ventral segments fringed with long yellow hairs; antennæ black; the scape and apical ten joints of the flagellum testaceous yellow beneath; legs black, with fuscous-brown pubescence, the anterior and intermediate tibiæ and tarsi posteriorly, and the apical three joints of the latter anteriorly, also fringed with long pale pubescence; wings fusco-hyaline, with a rich purple effulgence.

Hab. Sylhet; Southern Tenasserim. ♂. *Length* 24–25; *exp.* 54 mm. ♀ unknown.

Genus BOMBUS.

Bombus, *Latr. Hist. Nat. Ins.* iii, p. 385 (1802).

Type, *B. terrestris*, Fabr.

Range. Both hemispheres.

The species belonging to this genus are densely pubescent. Head not so wide as the thorax, with front and face frequently elongate; the eyes rather narrow, not reaching down to the base of the mandibles; the ocelli nearly in a straight line on the vertex; the antennæ geniculate, long and filiform in the ♂; the clypeus convex, generally much longer than broad; labrum ciliated, and in all the Indian species I know incised in the middle; mandibles stout, broad, grooved at their apex, which is rounded; tongue elongate, pubescent; labial palpi 4-jointed, the proportions of the

basal two joints varying in different species, apical two joints always minute; maxillary palpi 2-jointed, of variable length. Thorax globose: wings long; fore wing with the radial cell narrow towards the apex, rounded and slightly appendiculate; three cubital cells, the 2nd cell of very characteristic shape, narrowed, curved, and produced inwards towards the base, receiving the 1st recurrent nervure, in all the Indian species known to me, before the middle; the 3rd cubital cell narrowed towards the radial, receiving the 2nd recurrent nervure towards the apex; legs stout, the posterior pair in the female smooth, with the tibiæ and tarsi broad and flattened, the former densely fringed with long curled hair on the outer side, forming a corbicula or pollen-basket; the basal joint of the tarsi oblong, externally concave, its edges fringed with short stiff hairs; the inner surface furnished with a dense brush of short hairs; the joint is notched at base, with a stout external tooth; claws of the tarsi bifid; in the male the legs are longer, the posterior tibiæ only slightly widened at apex and convex externally. Abdomen always more or less densely pubescent.

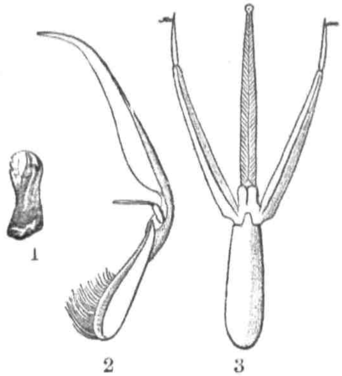

Fig. 183.—*Bombus*. 1, mandible; 2, maxilla; 3, labium. (Much enlarged.)

The Indian species of *Bombus* occur, so far as I know, only on the higher hills, especially in the Himalayas. The habits are very similar to those of their British allies, but no observations have been recorded as to which species are surface-builders and which burrowers-under-ground. The female, males, and orkers differ considerably in size.

Key to the Species.

A. Mesonotum above with a transverse band of pubescence differently coloured to rest of pubescence on thorax.
- *a*. Pubescence on 2nd abdominal segment black.
  - *a′*. Pubescence on 1st abdominal segment hoary white . . . . *B. rufofasciatus*, p. 547.
  - *b′*. Pubescence on 1st abdominal segment yellow.
    - *a²*. Pubescence on legs black . . . . *B. montivagus*, p. 547.
    - *b²*. Pubescence on legs fulvous.
      - *a³*. Clypeus much longer than broad . *B. magrettii*, p. 548.
      - *b³*. Clypeus much broader than long . *B. channicus*, p. 548.
- *b*. Pubescence on 2nd abdominal segment yellow . . . . *B. trifasciatus*, p. 548.

c. Pubescence on 2nd abdominal segment hoary or ochraceous white.
  a'. Abdominal segments 3–5 with ochraceous-white pubescence, the bases of segments with transverse black pubescent fasciæ .... *B. personatus*, p. 548.
  b'. Abdominal segment 3 with black, 4 and 5 with orange-red pubescence ...... *B. tunicatus*, p. 549.

B. Mesonotum without a transverse band of pubescence, differently coloured to rest of pubescence on thorax.
 a. Pubescence on head, thorax, and abdomen all of one colour.
  a'. Pubescence black .... *B. eximius*, p. 549.
  b'. Pubescence yellow .... *B. flavescens*, p. 550.
 b. Pubescence on head, thorax, and abdomen not all of one colour.
  a'. Apical two or more abdominal segments with black pubescence.
   a^2. Pubescence on 3rd abdominal segment fuscous brown or black.
    a^3. Pubescence on thorax yellow .... *B. melanurus*, p. 550.
    b^3. Pubescence on thorax fuscous brown .... *B. assamensis*, p. 550.
   b^2. Pubescence on 3rd abdominal segment fulvous .... *B. andamanus*, p. 551.
  b'. Apical two or more abdominal segments with grey or hoary-white pubescence.
   a^2. Pubescence on 2nd abdominal segment bright fawn-colour .... *B. atrocinctus*, p. 551.
   b^2. Pubescence on 2nd abdominal segment silvery grey, narrowly black along base .... *B. funerarius*, p. 551.
   c^2. Pubescence on 2nd abdominal segment black.
    a^3. Pubescence on thorax above rich fulvous red .... *B. terminalis*, p. 552.
    b^3. Pubescence on thorax above hoary or ochraceous white.
     a^4. Pubescence on 1st abdominal segment pale yellow .... *B. flavothoracicus*, [p. 552.
     b^4. Pubescence on 1st abdominal segment black .... *B. festivus*, p. 553.
  c'. Apical two or more abdominal segments with yellow or red pubescence of some shade.
   a^2. Pubescence on thorax silvery grey .. *B. funerarius*, var., [p. 552.
   b^2. Pubescence on thorax ochraceous or yellow.
    a^3. Pubescence on 3rd abdominal segment vermilion-red .... *B. miniatus*, p. 553.
    b^3. Pubescence on 3rd abdominal segment brown .... *B. vallestris*, p. 553.
   c^2. Pubescence on thorax black.
    a^3. Pubescence on 3rd abdominal segment bright rufo-fulvous ...... *B. hæmorrhoidalis*, [p. 554.

b^3. Pubescence on 3rd abdominal segment black.
  a^4. Basal two abdominal segments with black pubescence ...... *B. simillimus*, p. 554.
  b^4. Basal two abdominal segments with yellow pubescence ...... *B. orientalis*, p. 555.
d^2. Pubescence on thorax bright fulvous. *B. longiceps*, p. 555.

957. **Bombus rufofasciatus**, *Smith, Trans. Ent. Soc.* n. s. ii, 1852, p. 48, ♀ ; *Dall. Torr. Cat.* x, p. 545.

♀. Head and face elongate, with long pubescence on the front, between the antennæ and above the clypeus ; the clypeus, vertex, and cheeks finely and closely punctured ; the thorax and abdomen densely pubescent, the apical segment of the last above without pubescence, convex and punctured. The head, the pronotum, the mesonotum posteriorly, the scutellum, the sides of the thorax, the upper part of the legs, and the 2nd abdominal segment with long black pubescence ; a band on the mesonotum anteriorly, the median segment, the basal and the 4th to 6th abdominal segments with greyish-white, and the 3rd segment with bright fulvous-red pubescence ; the pubescence short and pale golden on the tibiæ and tarsi, and bright fulvous at the extreme apex of the anal segment ; wings hyaline, lightly fuscescent towards the apical margins.

☿ similar, smaller, the basal two abdominal segments with pale yellow, the 3rd with black, and the apical three with orange-red pubescence.

Hab. Northern India (*Smith*) ; Sikhim, 12,500 ft. ♀. *Length* 23 ; *exp.* 48 mm. ☿. *Length* 15 ; *exp.* 31 mm.

958. **Bombus montivagus**, *Smith, J. A. S. B.* xlvii, 1878, p. 168, ♀ ; *Dall. Torr. Cat.* x, p. 535 ; *Bingh. Jour. Bomb. N. H. Soc.* viii, p. 388, pl. i, fig. 12.

♀. Head and face elongate, only pubescent on the front between the antennæ and on the occiput, the rest smooth, shining, with a few minute punctures on the cheeks and vertex ; the thorax and abdomen densely pubescent, the apical segment of the latter narrowly bare above, with a short medial furrow. Black ; the pubescence on the head, the mesonotum, on the scutellum anteriorly, the legs, and on the 2nd and 3rd abdominal segments black ; on the pronotum, the sides of the thorax, the scutellum posteriorly, the median segment, and on the apical three abdominal segments fulvous red : on the basal abdominal segment bright yellow ; wings fuscous, dull, with scarcely any effulgence.

☿ similar ; smaller : a patch of white pubescence beneath the wings and on the sides of the median segment ; the 2nd to the 4th abdominal segments with black, the apical two segments only with fulvous-red pubescence.

Hab. Pegu Hills, Burma ; Dawnat Range, 4000 ft ; Karennee, 5000 ft. ♀. *Length* 25 ; *exp.* 50 mm. ☿. *Length* 16 ; *exp.* 32 mm. ♂ unknown.

*959. **Bombus magrettii,** *Grib. Bull. Soc. Ent. Ital.* xxiii, p. 115, ♀ ♂; *Dall. Torr. Cat.* x, p. 532.

"♀ ♂. Black, the tarsi sometimes (chiefly the posterior four) more or less rufo-ferruginous; head much lengthened; the clypeus much higher than broad; cheeks broader than the eyes; the apical ventral segment obsoletely canaliculate; head, the disc of the thorax, and the 2nd and 3rd abdominal segments above clothed with black, the rest of the thorax, the legs, and the 4th and following abdominal segments with fulvous pubescence; the tibiæ and tarsi, sometimes also the apical abdominal segment, with ferruginous pubescence; the pubescence on the basal abdominal segment yellow; wings subinfuscate.

"☿. *Length* 14 mm. ♂. *Length* 10–13 mm."

Hab. Shan Yoma, Burma.

Unknown to me, but closely resembling *B. montivagus*, Smith, differing apparently only in the colour of the legs.

*960. **Bombus channicus,** *Grib. Bull. Soc. Ent. Ital.* xxiii, p. 116, ♀ ☿; *Dall. Torr. Cat.* x, p. 514.

"♀ ☿. Closely resembling and allied to *B. magrettii*; but the head is shorter, the clypeus much broader than high, and the cheeks uniformly in transverse diameter half the width of the eyes.—*Length*, ♀ 19 mm.; ☿ 10 mm."

Hab. Shan Yoma, Burma.

961. **Bombus trifasciatus,** *Smith, Trans. Ent. Soc.* n. s. ii, 1852, p. 43, ♀, pl. viii, fig. 4.

Bombus hæmaturus, *Kriechb., var.* trifasciatus, *Handl. Ann. Naturhist. Hofmus. Wien*, iii (1888), p. 215.

♀. Head and face not particularly elongate: the front and cheeks with a dense short pile, and on the front tufts of long pubescence; vertex, space between eyes beneath, and base of mandibles bare, polished and shining; the thorax and abdomen densely pubescent; anal segment above bare, finely punctured. Head, a broad transverse band on the thorax, the legs, and the 3rd abdominal segment with black pubescence; the thorax anteriorly and posteriorly, and the median segment with pale, and the basal two abdominal segments with brighter yellow pubescence; the fine dense pile on the face and cheeks pale ochraceous; the apical three abdominal segments with rich fulvous-red pubescence; the apex of the tibiæ and the tarsi with ferruginous pile; wings fusco-hyaline.

☿ similar, smaller; the transverse black band on the thorax broader.

Hab. Chusan, China (*Smith*); Sikhim, 12,500 ft., on the pass (Jelap La) into Chumbi. ♀. *Length* 24–26; *exp.* 52–54 mm. ☿. *Length* 19; *exp.* 42 mm.

962. **Bombus personatus,** *Smith, New Sp. Hym. B. M.* p. 132, ♀; *Dall. Torr. Cat.* x, p. 540.

♀. Head and face narrow, elongate; the vertex, cheeks and

clypeus bare, finely punctured; the space between the eyes and base of mandibles highly polished, impunctate, shining. Black, covered with ochraceous white pubescence; a broad transverse band between the tegulæ with dense, and the base of abdominal segments 3–5 with bands of thin, black pubescence; the apical segment with a thin covering of black hairs above; the pubescence on the head and face sprinkled plentifully with black hairs, and the greater part of the legs covered with short black, the inside of the posterior tarsi with ferruginous pubescence; wings hyaline, broadly fuscescent along their apical margins.

Hab. Kunawar District, Northern India. ♀. *Length* 22; *exp.* 46 mm. ☿ and ♂ unknown.*

963. **Bombus tunicatus.** (Pl. IV, fig. 10.)
Smith, Trans. Ent. Soc. n. s. ii, 1852, p. 43, pl. viii, fig. 7; *Dall. Torr. Cat.* x, p. 560.

♀. Head and face not particularly long; clypeus, cheeks, vertex, and space between the orbits of the eyes beneath and the base of the mandibles bare, shining, punctured; the front above the clypeus, the thorax, and abdomen densely pubescent; apical abdominal segment bare above, punctured, not carinate. Black; the head, a transverse broad fascia between the wings, the legs, and the 3rd abdominal segment covered with black, thorax anteriorly and posteriorly and the basal two abdominal segments with hoary white, and the apical three abdominal segments with bright orange-red pubescence; wings fusco-hyaline, darker towards the costal margin.

Fig. 184.—*Bombus tunicatus*, ♀. 1/1.

♂ similar, smaller; the head entirely covered with thin (not dense) rather long fuscous pubescence; the transverse fascia on the mesonotum between the wings narrower; wings somewhat paler.

☿ resembles the ♀, much smaller; the 2nd, sometimes also 1st, abdominal segment with dull orange-red pubescence.

Hab. China; Kumaun; Mussooree (*Rothney*). ♀. *Length* 20–22; *exp.* 43–45 mm. ☿. *Length* 13–15; *exp.* 27–29 mm. ♂. *Length* 17; *exp.* 36 mm.

964. **Bombus eximius,** *Smith, Trans. Ent. Soc.* n. s. ii, 1852, p. 47, ♀, pl. viii, fig. 5; *Dall. Torr. Cat.* x, p. 519.

♀. Head and face not particularly elongate; the clypeus convex; vertex of head, the cheeks, space between the orbits of the eyes beneath and the base of the mandibles, and the clypeus smooth

* B. BELLICOSUS, Smith, New Sp. Hym. B. M. p. 131, stated to be from "Sumatra or India," is without doubt American, and identical with *B. thoracicus*, Sich. (nec Spin.), Ann. Soc. Ent. Fr. 1862, p. 121.

and shining. Black, with long black pubescence; the legs bright testaceous; the wings fulvo-hyaline.

♂ and ☿ smaller, similar; the ♂ differing only in having longer legs.

Hab. Sylhet; Sikhim, 2000–8000 ft.; Taoo plateau, 4000 ft.; Moolayit, 5000 ft.; Tenasserim. ♀. *Length* 28–31; *exp.* 56–59 mm. ☿. *Length* 15–21; *exp.* 33–40 mm.

965. **Bombus flavescens**, *Smith, Trans. Ent. Soc.* n. s. ii, 1852, p. 45, ♂; *Dall. Torr. Cat.* x, p. 520.

☿. Head and face somewhat narrow and elongate; the vertex, the space between the eyes and base of the mandibles (but not the cheeks), and the clypeus bare, smooth and shining; the rest of the head, the thorax, and abdomen densely pubescent; the anal segment convex, bare and punctured. Head, thorax, and abdomen covered with long bright pale yellow pubescence; the legs bright reddish testaceous; wings hyaline, very slightly fuscescent, and darkening towards the apex.

♂ similar, slightly larger.

Hab. Chusan, China; Sikhim, above 10,000 ft. ☿. *Length* 12–15; *exp.* 25–28 mm. ♂. *Length* 17; *exp.* 33 mm.

966. **Bombus melanurus,** *Lepel. Hym.* i, p. 469, ♀ ☿; *Dall. Torr. Cat.* x, p. 533.

Bombus altaicus, *Eversm. Bull. Soc. Nat. Mosc.* xix, pt. 1 (1846), p. 436, pl. iv, fig. 1; *Smith, 2nd Yark. Miss., Hym.* p. 9.

♀ or ☿. Head and face elongate; front pubescent; vertex, cheeks, and clypeus finely punctured; space between eyes and base of mandibles smooth and polished; thorax and abdomen densely pubescent; apical four segments of the latter more or less bare in the middle above and punctured. Black; the pubescence on the head in front blackish mixed with griseous; on the occiput, thorax, and basal two segments of the abdomen bright yellow; on the legs and apical four segments of the abdomen jet-black, on the tarsi of the legs slightly rufescent; wings fusco-hyaline and violaceous.

Hab. Syria; Siberia; Pangong Valley, Ladák. ☿. *Length* 12; *exp.* 26 mm. I have only seen a single ☿ of this species. The ♀ is said to be 27 mm. long.

967. **Bombus assamensis,** n. sp.

☿. Head and face narrow elongate; the vertex, the space between the eyes and the base of the mandibles, and the clypeus bare, smooth, impunctate; the clypeus boldly convex; rest of the head, the thorax, and abdomen densely pubescent; anal segment above bare and minutely punctured, not carinate. Head, pro- and mesonotum, and apical four abdominal segments with fuscous-brown pubescence, reddish in certain lights; the sides of the thorax

with snow-white, the basal two abdominal segments with pale ochraceous pubescence; legs black, with fuscous pubescence, the tibiæ and tarsi dark rufo-testaceous; wings light fuscous, paler towards their apical margins.

♂ similar, the antennæ and legs only longer proportionately.

Hab. Margherita, Assam. ☿. *Length* 16; *exp.* 34 mm. ♂. *Length* 18; *exp.* 38 mm.

*968. **Bombus andamanus,** *Grib. Ann. Mus. Civ. Gen.* xviii (1882), p. 268, ♀? ☿?; *Dall. Torr. Cat.* x, p. 510.

☿ or ♀. "Black, the posterior two tarsi red; clypeus slightly broader than high, cheeks trapezoidal in outline, narrower than the eyes; head and thorax with black pubescence mixed with yellowish hairs, chiefly on the front and on the mesopleuræ, tibiæ and tarsi with reddish pubescence; abdomen, the 1st segment covered with dense yellow, and a little black pubescence on either side of the disc; 2nd segment clothed broadly with fulvous and a basal fascia of jet-black pubescence angularly produced in the middle; 3rd segment covered entirely with fulvous, and apical three segments with black pubescence; beneath, the abdomen has yellow pubescence; wings subfuscous.

"☿ or ♀. *Length* 17 mm."

Hab. The Andamans (*Gribodo*).

969. **Bombus atrocinctus,** *Smith, Trans. Zool. Soc.* vii, p. 193, ♂, pl. xxi, fig. 13; *Dall. Torr. Cat.* x, p. 512.

♀ or ☿. Head, thorax, and abdomen densely pubescent; the vertex of the head, and the space between the orbits of the eyes beneath and the base of the mandibles non-pubescent, highly polished and shining. Clypeus and head in front with pale ochraceous pubescence mixed with long black hairs; thorax and basal two abdominal segments with bright fawn-coloured pubescence of a deeper fulvous tint on the thorax; legs with black pubescence mixed with pale hairs above, and ferruginous on the tarsi; 3rd and 4th abdominal segments with black, apical two with hoary whitish pubescence; wings hyaline, broadly fuscescent along the apical margins.

Fig. 185.—*Bombus atrocinctus*, ☿. 1/1.

♂ similar, the wings slightly darker, the apical three abdominal segments with griseous pubescence, the pubescence on the tarsi entirely ferruginous.

Hab. Kumaun; Sikhim. ♀ or ☿. *Length* 14; *exp.* 34 mm. ♂. *Length* 13; *exp.* 35 mm.

970. **Bombus funerarius,** *Smith, Trans. Ent. Soc.* n. s. ii, 1852, p. 47, pl. viii, fig. 6; *Dall. Torr. Cat.* x, p. 521.

♀. Head and face elongate, sparsely pubescent; the vertex,

cheeks, space between eyes and base of mandibles, and the clypeus bare, highly polished and shining; thorax and abdomen densely pubescent; anal segment of latter above concave and bare, with a medial longitudinal carina. Head, thorax, the whole of the 1st, base narrowly of the 2nd, and the apical three abdominal segments covered with silvery grey pubescence, looking brighter or duller in different lights, and forming a well-marked abbreviated medial longitudinal silvery line on the mesonotum; the pubescence on the upper portion of the legs, on the 2nd abdominal segment posteriorly, and on the whole of the 3rd segment jet-black; the tarsi and the extreme apex of the abdomen bright ferruginous: wings light fuscous with a purple effulgence.

Fig. 186.—*Bombus funerarius*, ♀. 1/1.

Var. The apical three abdominal segments with bright orange-red, not grey pubescence.

Hab. Northern India (*Smith*); Sikhim, 8000 feet. ♀. *Length* 25; *exp.* 50 mm. ☿ and ♂ unknown.

The variety with the apical three segments orange-red was the only one I procured in Sikhim.

971. **Bombus terminalis**, *Smith, Trans. Zool. Soc.* vii, p. 193, ♂ (*nec Smith, Trans Ent. Soc.* 1873, p. 206).

Bombus hypnorum, *var.* terminalis, *Handl. Ann. Naturhist. Hofmus. Wien*, iii (1888), p. 217; *Dall. Torr. Cat.* x, p. 526.

♀ ☿. Clypeus, space between the orbits of the eyes beneath and the mandibles, and the vertex of the head non-pubescent, highly polished and shining; clypeus convex, with a few coarse punctures; labrum slightly exserted beneath the clypeus; head, thorax, and abdomen densely pubescent. Head in front, the occiput, the upper part of the legs, the sides of the thorax and of the median segment, and the basal four abdominal segments covered with black pubescence, the thorax and median segment above with long rich fulvous-red pubescence, the pubescence on all the tarsi and also on the intermediate tibiæ towards the apex ferruginous; apical two abdominal segments with dense greyish pubescence; wings fusco-hyaline, with a slight but brilliant purple effulgence.

♂ similar; the clypeus with fulvous-white pubescence, the apical three abdominal segments with greyish pubescence; wings paler.

Hab. The Himalayas from Simla to Sikhim. ♀. *Length* 18; *exp.* 42 mm. ☿. *Length* 15; *exp.* 34 mm. ♂. *Length* 16; *exp.* 40 mm.

972. **Bombus flavothoracicus**, n. sp.

♀. Head and face not elongate; the clypeus, vertex, cheeks, and space between eyes and base of mandibles bare and shining; the clypeus convex, the vertex punctured, the thorax and abdomen

the pubescence on the head, upper part of the legs, and 2nd and 3rd abdominal segments black, on the head mixed with a little griseous pubescence; the thorax (except the disc of the mesonotum probably through abrasion) covered with pale ochraceous, the basal abdominal segment with pale sulphur-yellow, and the apical three segments with hoary white pubescence: the extreme apex of the anal segment with a thick short fulvous-red pile; the antennæ piceous; the tarsi with a thin ferruginous pile; wings light fuscous nervures and tegulæ black.

? ☿ similar, smaller; the thorax in front of a line between the tegulæ of the wings and the basal two abdominal segments with bright yellow, the head, the posterior half of the thorax, the legs, and the 3rd and 4th abdominal segments with black pubescence, the pubescence on the head mixed with greyish, that on the apical two abdominal segments hoary white; wings paler than in the female.

Hab. Sikhim, above 10,000 feet. ♀. *Length* 24–26; *exp.* 49–51 mm. ☿. *Length* 14–16; *exp.* 36 mm.

I am not certain whether I have correctly identified the ☿. This fine humble-bee was common on the high mountain behind our frontier station of Gnatong (12,500 feet), in Native Sikhim, in May.

973. **Bombus festivus**, *Smith, Jour. Ent.* i, 1861, p. 152, ♀; *Dall. Torr. Cat.* x, p. 520.
Bombus mölleri, *Bingh. Jour. Bomb. N. H. Soc.* x, 1896, p. 197.

♀. Clypeus and front smooth, shining, with a few scattered large punctures; clypeus bare, front of the head thinly, the rest of the head, the thorax, and abdomen densely pubescent. Black, with black pubescence, the thorax and the apical two abdominal segments with hoary white pubescence; antennæ and legs piceous, turning to dark testaceous on the inner side of the posterior tibiæ and tarsi; the anterior and posterior tibiæ and tarsi and the intermediate tarsi somewhat rufescent; wings light fuscous, nervures and tegulæ brown.

Hab. Kumaun; Sikhim above 6000 feet. ♀. *Length* 25–27; *exp.* 50 mm.

974. **Bombus miniatus**, *n. sp.*

♂. Somewhat resembling *B. flavescens* (p. 550), but the head and face broader, not elongated, the legs black, with ferruginous golden pubescence; the head, thorax, and basal two abdominal segments with long dense dark greenish-yellow, the apical four segments above with rich vermilion-red pubescence, the wings similar to those of *B. flavescens*.

Hab. Sikhim, over 10,000 feet. ♂. *Length* 16; *exp.* 38 mm. ♀ and ☿ unknown. Type in coll. British Museum.

975. **Bombus vallestris**, *Smith, 2nd Yark. Miss., Hym.* p. 8, ☿ ♂; *Dall. Torr. Cat.* x, p. 560.

♀. Head and face subrotundate; the vertex, the space between the eyes and the base of the mandibles, and the clypeus bare, impunctate, highly polished; thorax and abdomen densely

pubescent; apical segment of the latter convex, covered with a dense close pile, mixed with long hairs. Head and thorax with pale ochraceous pubescence, thickly sprinkled with long black hairs; the basal two abdominal segments with pale yellow pubescence, brownish ferruginous along the base of the 2nd segment, 3rd segment with brown, the apical three segments above with golden ferruginous pubescence, darkening to brown on the sides of the 4th and 5th segments; legs obscure rufo-testaceous above, bright testaceous on the tibiæ and tarsi; the intermediate trochanters beneath, the tibiæ and tarsi with shining golden-brown pubescence; wings more or less fusco-hyaline.

☿ and ♂ similar, smaller; the pubescence on the head and face more densely set with black hairs, and on the apical segments of the abdomen brighter ferruginous.

Hab. Drás, Kárgil, Leh in Ladák; Sikhim above 7000 feet. ♀. *Length* 17–18; *exp.* 35–37 mm. ☿. *Length* 14 mm; *exp.* 33 mm.

976. **Bombus hæmorrhoidalis,** *Smith, Trans. Ent. Soc.* n. s. ii, 1852, p. 43, ♀ ♂ ☿; *Dall, Torr. Cat.* x, p. 521.

♀. Face elongate; clypeus, front above base of antennæ, and the vertex smooth and shining, without pubescence, the clypeus and front with a few scattered large punctures, the sides of the face along the inner orbits finely and closely punctured. Black, with black pubescence, on the tarsi slightly rufescent, the pubescence on the basal two abdominal segments bright yellow, on the apical four bright rufo-fulvous; wings dark fuscous.

☿ smaller, but precisely similar in colouring.

♂ similar; the head, thorax, and legs with sooty-black pubescence, mixed with pale hairs on the legs; the apical abdominal segments with paler fulvous-red pubescence than in the female; tarsi ferruginous.

Hab. Chusan, China; Northern India; Mussooree (*Rothney*); Kumaun (*Miss A. Brook*). ♀. *Length* 22–25; *exp.* 48–50 mm. ☿. *Length* 12–14; *exp.* 36 mm. ♂. *Length* 15–18; *exp.* 38–44 mm.

977. **Bombus simillimus,** *Smith, Trans. Ent. Soc.* n. s. ii, 1852, p. 48, ♀; *Dall. Torr. Cat.* x, p. 548.

♀. Head and face not remarkably elongate; the vertex, cheeks, space between eyes and mandibles, and clypeus bare, finely and sparsely punctured; thorax and abdomen densely pubescent; the anal segment above bare and finely rugose, with a **V**-shaped hollow. Black, with black pubescence, the apical three abdominal segments covered with rich orange-red pubescence, the apical three joints of the tarsi testaceous, the inside of the posterior tarsi with short ferruginous-red pubescence, the calcaria deep red; wings dark fusco-hyaline.

☿ similar, smaller, wings more hyaline.

Hab. Northern India (*Smith*); China. ♀. *Length* 24; *exp.* 48 mm. ☿. *Length* 11; *exp.* 23 mm.

978. **Bombus orientalis**.* (Pl. IV, fig. 9.)

Smith, Cat. ii, p. 402, ♀; *Dall. Torr. Cat.* x, p. 538.
Bombus buccinatoris, *Smith, New Sp. Hym. B. M.* p. 132, ♀.
? Bombus simulus, *Grib. Bull. Ent. Soc. Ital.* xxiii, 1891, p. 114, ♀.

♀. Head and face elongate, only slightly pubescent; the vertex, cheeks, space between eyes and base of mandibles, and the clypeus bare, polished and shining; the clypeus convex and slightly punctured; thorax and abdomen densely pubescent; anal segment narrowly bare above, concave, and bearing two parallel, short, broad, medial longitudinal carinæ. Head, thorax, upper part of the legs, and the 3rd abdominal segment clothed with black, the basal two segments with pale yellow, and the apical three segments with rich fulvous-red pubescence; tarsi more or less with short ferruginous pubescence; wings dark fuscous with a rich purple effulgence.

☿ similar, smaller, the basal two abdominal segments with brighter yellow pubescence.

Var. *buccinatoris*, Smith.—According to the description, with bright yellow pubescence on the median segment also, but not so in the specimen marked as the type; the 4th as well as the 3rd abdominal segment with black, the apical two with bright ferruginous pubescence.

♂ similar to the female; smaller, with brighter yellow pubescence on the basal two abdominal segments, and the wings paler.

Hab. Sikhim; Kunawar. ♀. *Length* 21–24; *exp.* 50 mm. ☿ *Length* 16–18; *exp.* 34–40 mm. ♂. *Length* 19–20; *exp.* 44 mm. One of the commonest species about Darjeeling.

*979. **Bombus longiceps**, *Smith, 2nd Yark. Miss., Hym.* p. 8, ☿ ♂; *Dall. Torr. Cat.* x, p. 532.

"☿. Black; the head elongate, the clypeus smooth and shining; the tips of the mandibles rufo-piceous, the flagellum of the antennæ obscurely fulvous beneath. Thorax above and beneath the wings densely clothed with bright fulvous pubescence, beneath and on the legs it is black, the four apical joints of the tarsi ferruginous; the wings hyaline. Abdomen—the three basal segments with black pubescence, usually more or less abraded towards the base, which is smooth and shining, the apical segment fulvo-ferruginous.

"*Length* 9 lines (= about 19 mm.).

"*Hab.* Drás, Kárgil, Leh, in Ladák. The male of this species is clothed exactly the same as the female, the face having also black pubescence."

Genus **PSITHYRUS**.

Psithyrus, *Lepel. Ann. Soc. Ent. Fr.* i, p. 366 (1832).
Apathus, *Newman, Ent. Mag.* ii, p. 404 (1834).

Type, *P. rupestris*, Fabr.

Range. Probably the same as that of *Bombus*.

Characters those of *Bombus*, except that the posterior tibiæ are convex exteriorly and densely pubescent, not furnished with a corbicula for carrying pollen; the basal joint of the posterior tarsi not toothed at its base above; abdomen incurved slightly at apex;

apical ventral segment with the lateral margins raised; and in the male the posterior tibiæ are only slightly attenuated at the base.

The species of this genus are well-known as inquilines, guests or messmates of the *Bombi*. Only one species, so far as I know, has as yet been recorded from within our limits.

*980. **Psithyrus bellardii**, *Grib. Bull. Soc. Ent. Ital.* xxiii (1891), p. 108, ♀; *Dall. Torr. Cat.* x, p. 566.

"♀. Of small size, nigro-fuscous; the head, thorax, a transverse fascia between the wings, the 2nd and 3rd abdominal segments above, and the legs with black pubescence; the extreme apex of the tarsi with reddish hairs; thorax, and the 1st, 4th, and 5th abdominal segments above with dense fulvous pubescence; wings fulvo-hyaline, slightly effulgent with purplish tints; labium as in most species tuberculate, the hypopygium formed as in the European *P. vestalis*.

"*Hab.* The Shan Yoma, Upper Burma. ♀. *Length* 15–19 mm."

Genus APIS.

Apis, *Linn. Syst. Nat.* i, p. 953 (1767).

Type, *A. mellifera*, Linn.

Range. Indigenous or introduced in all parts of the world.

☿. Head * as wide as the thorax; eyes ovate, pubescent; antennæ in a triangle on the vertex; clypeus elongate; the labial palpi 4-jointed, the 2nd joint much shorter than the 1st, apical two minute; maxillary palpi 1-jointed. Thorax globular: fore wing long, rather narrow, the radial cell long, narrow and rounded at apex; three cubital cells, the 1st and 3rd nearly subequal on the cubital nervure, but slightly varying in different species; the 2nd irregularly subtriangular, and nearly twice as long measured on the cubital nervure as either of the other two; the 1st recurrent nervure received before the middle in the 2nd cubital cell, the 2nd recurrent nervure received in the 3rd cubital cell near or at the apex: legs stoutish, the anterior and intermediate tibiæ with a spine at their apex; the posterior tibiæ not spined, extremely smooth and shining, the margins fringed with long hair curving inwards and forming the sides of the corbicula; the 1st joint of the tarsi slightly produced at its base above, fringed with long hair, on the inside with rows of stiff hairs. Abdomen more or less truncate at base, above convex, subcylindrical, the sting curved.

Fig. 187.—*Apis florea*, ♀. $\frac{3}{2}$.

♀. Differs in the head being narrower than the thorax, the posterior tibiæ convex externally and not fringed with hair, the basal joint of the tarsi not produced above and not furnished with the rows of stiff hairs; abdomen proportionately much longer, the sting straight.

* An outline figure of the head of *Apis* showing the mouth-parts is given

♂. More stoutly built, head and thorax more pubescent; eyes very large, meeting on the vertex, the ocelli placed on the front above the base of the antennæ; posterior tibiæ smooth and shining externally, convex and narrowed at base; the basal joint of the tarsi broad, in one species produced below into a remarkable lobe; abdomen very wide, cylindrical, obtuse at apex.

The communities consist of males, a single female or queen, and the workers. The economy of the honey-bee is too well known to need much notice here. Within our limits only three species of true *Apis* occur. So far as my observation goes *Apis dorsata*, Fabr., the largest of the three species, in its wild state builds its combs exclusively more or less in the open—that is to say, on the undersides of the branches of large trees, in caves or under overhanging rocks, in buildings, &c. This is the large bee that when disturbed attacks men or animals. *Apis indica*, on the contrary, very frequently chooses hollow trees to build in. In Burma, where the houses are built chiefly of wood, I have more than once seen a house rendered nearly uninhabitable by a swarm of *Apis indica* taking possession of the hollows under the wooden staircases, or between the outer walls when these were built double.

The smallest species of the genus in India, *Apis florea*, is not nearly so plentiful in Burma as are the other two species. I have seen very few nests; one was built in a cane-bush not more than a few inches from the ground; another under the eaves of the roof of a forest bungalow.

No species of honey-bee is domesticated by the Burmans. In the Himalayas *Apis indica*, which is closely allied to *A. mellifera*, is, I believe, the bee usually kept for its honey and wax.

Horne (Trans. Zool. Soc. vii, pp. 181–184) gives much interesting information in regard to the three species of bees found in India, their parasites, habits, &c.

Key to the Species.

a. Of large size. ☿ length 16–18 mm. . . . . *A. dorsata*, p. 557.
b. Smaller. ☿ length 11–12 mm. . . . . *A. indica*, p. 558.
c. Still smaller. ☿ length 8 mm. . . . . *A. florea*, p. 559.

981. **Apis dorsata.** (Pl. IV, fig. 11.)

Fabr. Ent. Syst. ii, p. 328; *Smith, Cat.* ii, p. 415; *Horne, Trans. Zool. Soc.* vii, p. 181, pl. 22, fig. 3; *Dall. Torr. Cat.* x, p. 589.
Apis bicolor, *Klug, Mag. n. Entd. ges. Naturk., Berlin*, i (1807), p. 264, pl. vii, fig. 3.
Apis nigripennis, *Lepel. Hym.* i, p. 403.
Apis testacea, *Smith, Jour. Linn. Soc.* ii (1858), p. 49.
Apis zonata, *Smith* (*nec Guér.*), *Jour. Linn. Soc.* iii (1859) p. 8.

☿. Head, thorax, and abdomen with short pubescence, more or less sparse or dense according to locality; the head and mesonotum finely punctured under the pubescence; a short, medial, vertical groove below the anterior ocellus. Head, thorax, legs, and apical three segments of the abdomen black, more or less pale and fuscous on the hinder part of the thorax and on the abdomen;

the basal three segments of the abdomen honey-yellow: pubescence fuscous on the head, thorax in front, legs above, and apical segments of the abdomen, pale ochraceous yellow on the hinder parts of the thorax and at the base of the abdomen; legs beneath, especially the posterior tibiæ and tarsi, with short ferruginous pubescence; wings pale fuscous or fusco-hyaline.

♀ similar; larger and darker.

♂ similar: much darker, the eyes very large.

Var. *bicolor*, Klug: similar, but the basal two segments of the abdomen only honey-yellow, the apical black, in strong contrast.

Var. *nigripennis*, Latr.: similar, much darker, with the wings very dark fuscous having a purple effulgence.

Var. *testacea*, Smith: similar, the entire abdomen pale testaceous yellow; wings subhyaline.

Var. *zonata*, Smith: similar; the head, thorax, and abdomen entirely black, with sometimes a transverse band of pale ochraceous pile at the base of abdominal segments 3–5; wings very dark.

Hab. Throughout India, Burma, Tenasserim; Ceylon; extending into China and the Malayan region to Java. ♀. *Length* 18–21; *exp.* 36–37 mm. ♂. *Length* 17; *exp.* 32 mm. ☿. *Length* 16–18; *exp.* 30–35 mm.

982. **Apis indica.** (Pl. IV, fig. 12.)

Fabr. Ent. Syst. Suppl. p. 274; *Smith, Cat.* ii, p. 416; *Dall. Torr. Cat.* x, p. 593.

Apis unicolor, *Latr. Ann. Mus. Hist. Nat.* v (1804), p. 168.

Apis perrottetii, *Guer. Icon. Règne Anim., Ins.* p. 461.

Apis nigrocincta, *Smith, Jour. Linn. Soc.* v (1861), p. 93.

☿. Head, thorax, and abdomen smooth and shining, sparsely pubescent, sometimes densely so. Head, thorax, and apical abdominal segment black: the scutellum and basal five segments of the abdomen testaceous yellow; legs rufo-fuscous, pubescence cinereous; wings hyaline and iridescent.

♀ similar; larger and darker.

♂ similar, stouter built; darker, the thorax densely pubescent.

Var. *unicolor*, Latr., is entirely deep shining black, with fusco-cinereous pubescence.

Var. *nigrocincta*, Smith, has the head and thorax black; the clypeus, labrum, and mandibles pale ferruginous; the scutellum, legs, and abdomen testaceous; the last with fuscous transverse bands on the apical margins of the segments.

Hab. Throughout India, Assam, Burma, Tenasserim, and Ceylon; extending through the Malayan region on the east and to Madagascar on the west. ♀. *Length* 16; *exp.* 32 mm. ♂. *Length* 13; *exp.* 27 mm. ☿. *Length* 11–12; *exp.* 21–23 mm.

This species merges into the common *Apis mellifera*, Linn., the honey-bee *par excellence* of Europe. The dark variety *unicolor*, which is the common form in Ceylon and in Madagascar, has been placed by some naturalists as a variety of *Apis mellifera*. In Burma, *nigrocincta* is the common form.

983. **Apis florea**, *Fabr. Mant. Ins.* i, p. 305; *Dall. Torr. Cat.* x, p. 591.
Apis lobata, *Smith, Cat.* ii, p. 416, ♂.
Apis andreniformis, *Smith, Jour. Linn. Soc.* ii (1858), p. 49.
Apis floralis, *Horne, Trans. Zool. Soc.* vii, p. 181, pl. 22, figs. 2, 2*a*.

☿. Head, thorax, and abdomen dull and opaque, very minutely aciculate, slightly pubescent. Black; the basal two abdominal segments more or less red; the pubescence on the head and thorax white, on the posterior tarsi ferruginous golden; in fine specimens there are narrow transverse bands of silky white pile at the base of the 2nd to the 5th abdominal segments; wings hyaline and iridescent, nervures testaceous, tegulæ black.

♀ similar, much larger; the anterior and intermediate tarsi, the posterior tibiæ and tarsi, the basal three abdominal segments, and the apical margins of the 4th and 5th segments rufo-testaceous; the face and front with silky snow-white pile; the legs covered with a thin, short, glittering pale pubescence.

♂ larger; black with dense long cinereous-white pubescence: the legs rufo-testaceous, the basal joint of the posterior tarsi swollen, with a remarkable curved lobe at base beneath. This is *Apis lobata*, Smith.

Var. *andreniformis* has only the basal margin of the 2nd abdominal segment reddish, and white pilose transverse bands at the bases of segments 3–6, the rest of the abdomen black.

Hab. Kumaun; Sikhim; North-West Provinces; Bengal; Central India; Madras; Bangalore; Malabar; Assam; Burma; Tenasserim; Ceylon; extending in the Malayan region as far as Java. ♀. *Length* 13; *exp.* 24 mm. ♂. *Length* 12; *exp.* 24 mm. ☿. *Length* 8; *exp.* 16 mm.

Genus MELIPONA.

Melipona, *Ill. Mag. Ins.* v, p. 157 (1806).
Trigona, *Jurine, Hym.* p. 245 (1807).

Type, *M. favosa*, Fabr.

Range. Both hemispheres.

Head transverse, flat in front; eyes narrow, consequently forehead and front broad, the orbits below reaching down to the base of the mandibles; ocelli almost in a straight line on the vertex; antennæ stout, geniculate, the flagellum filiform; clypeus subtriangular, flat, barely convex, its anterior margin transverse or subemarginate. Thorax globose; pronotum depressed below the level of the mesonotum; mesonotum convex; scutellum subtriangular, margined and projecting over the postscutellum and median segment, separated from the mesonotum by a transverse groove; postscutellum and

Fig. 188.—*Melipona lutea*, ☿. $\frac{2}{1}$.

median segment depressed, the latter rounded posteriorly; legs

stout, long; posterior tibia flattened, very broad, oar-shaped, slightly concave in the female and worker on the outside, and fringed with stiff hairs above and below, forming a corbicula or pollen-basket; posterior tarsi also flattened, the first joint very broad, the succeeding ones minute; in the male the posterior tibiæ and tarsi are more rounded: wings long and ample; fore wing with the usual nervures very incomplete, the stigma well marked, the radial cell elongate, reaching to the apex of the wing; one or two cubital cells in the Indian species, more or less obsolete and by the loss of the separating nervures merged into the 2nd and 3rd discoidal cells. Abdomen of variable shape, generally short, broad, somewhat flat, sometimes elongate, with the sides nearly parallel, occasionally narrowed at base, subclavate.

The dammar-bees, as the species of this genus are sometimes called, are widely spread, being plentiful in South America and in the Oriental region. All the species known to me build their nests in hollows of trees, crevices among rocks, sometimes in holes in stone walls. Horne (Trans. Zool. Soc. vii, p. 185) gives an interesting account of the finding of the nest of *Melipona (Trigona) ruficornis*, Smith, and states that the hollow in which it was built was coated all over with a layer of black wax, and that the cells, containing a dark honey of excellent flavour, were globular in shape, pendent side by side from the roof. In 'Science Gossip' for 1866, p. 198, the Rev. C. S. P. Parish, then chaplain of Maulmain, gives an excellent description of the nest of *Melipona (Trigona) læviceps*, Smith, a fairly common species in Burma. He mentions the extraordinary trumpet-shaped structure of resinous wax, which very often forms the entrance to the nests of the dammar-bees, projecting from the hole in the tree for a foot or more. The resinous product collected and used by the bees in making their nests is called "Pwé-nyet" by the Burmese, and after boiling in water and mixing with earth-oil or petroleum is largely used for the caulking of boats. The right of collecting "pwé-nyet" is sold by the Local Government in Burma and Tenasserim yearly, and forms one of the sources of revenue under Minor Forest Products.

Key to the Species.

A. Wings dark brown at base, milk-white or hyaline beyond stigma of fore wing.
  a. Legs entirely black .... *M. vidua*, p. 561.
  b. Legs more or less testaceous or piceous.
    a'. Face in front and clypeus black, latter with a testaceous spot .... *M. collina*, p. 562.
    b'. Face in front and clypeus entirely pale testaceous .... *M. apicalis*, p. 562.
  c. Anterior legs pale reddish yellow, posterior four except apical joint of tarsi jet-black. *M. atripes*, p. 561.
B. Wings hyaline and iridescent.
  a. Abdomen entirely black .... *M. canifrons*, p. 562.
  b. Abdomen more or less testaceous.

a'. Basal abdominal segment and abdomen beneath markedly white or testaceous white .... *M. ventralis*, p. 562.
b'. Basal abdominal segment not differing markedly in colour from remaining segments.
*a*². Vertex of head and front highly polished, shining .... *M. læviceps*, p. 563.
*b*². Vertex of head and front not polished, opaque.
*a*³. Legs entirely rufo-testaceous .... *M. smithii*, p. 563.
*b*³. Legs black, apical 3 or 4 joints of tarsi only testaceous .... *M. iridipennis*, p. 563.
*c*³. Legs black, anterior and intermediate tarsi and posterior tibiæ and tarsi only testaceous .... *M. præterita*, p. 564.
C. Wings flavo- or pale fusco-hyaline.
a. Head, thorax, and abdomen entirely of a pale honey-yellow .... *M. lutea*, p. 564.
b. Head, thorax, and abdomen black, a square mark on mesonotum rufo-testaceous .... *M. thoracica*, p. 564.

984. **Melipona vidua**, *Lepel. Hym.* i, p. 429, ☿; *Dall. Torr. Cat.* x, p. 585.

Fig. 189.—*Melipona vidua*, ☿. $\frac{3}{1}$.

☿. Head and thorax dull and opaque, a deep abbreviated furrow in front of the anterior ocellus; abdomen smooth, shining. Black; the face in front with a thin cinereous pile; antennæ and the anterior tarsi brownish; wings deep brown for more than half their length from base, milky white beyond.

Hab. India (*Smith*); Burma; Tenasserim, and the Malayan region to Timor. ☿. *Length* 6–7; *exp.* 14–15 mm.

This species is fairly common in the plains and valleys in Burma and Tenasserim, but does not extend up to the higher hills.

985. **Melipona atripes.**

Trigona atripes, *Smith, Jour. Linn. Soc.* ii (1858), p. 50, ☿.
Melipona atripes, *Dall. Torr. Cat* x, p. 576.

☿. Head smooth, impunctate; mesonotum and scutellum with a few large coarse punctures; median segment and abdomen smooth and shining, the latter broad at base and somewhat short. Pale reddish yellow; the face in front and the sides of the thorax with short pale thin pubescence, the scutellum fringed with fuscous hairs; the basal segments of the abdomen darkening to brown; the anterior legs pale reddish yellow, the posterior four jet-black, the apical joints of their tarsi ferruginous; wings reddish brown, milky-white beyond the stigma.

Hab. Malacca; Mergui, South Tenasserim. ☿. *Length* 5; *exp.* 11 mm.

986. **Melipona collina.**

Trigona collina, *Smith, Jour. Linn. Soc.* ii (1858), p. 51, ☿.
Melipona collina, *Dall. Torr. Cat.* x, p. 577.

☿. Head and thorax opaque, sparsely pubescent; abdomen smooth and shining, broad, short, somewhat flat. Head, thorax, and abdomen black; the head in front and clypeus with cinerous pile; a spot on the latter, the scape and flagellum of the antennæ beneath, and the legs rufo-testaceous; the basal segment of the abdomen obscurely testaceous, dark brown in some specimens, with a subapical transverse testaceous fascia above; wings dark brown at base, the apex beyond the stigma in the fore wing milk-white.

Hab. Southern Tenasserim; Malacca. ☿. *Length* 6–7; *exp.* 15–16 mm.

987. **Melipona apicalis.**

Trigona apicalis, *Smith, Jour. Linn. Soc.* ii (1858), p. 51, ☿.
Melipona apicalis, *Dall. Torr. Cat.* x, p. 575.

☿. Head and thorax opaque, sparsely covered with erect pubescence; abdomen smooth, shining, very finely aciculate, a very short deep impression below the anterior ocellus; abdomen short, broad, flattish. Head and face in front and clypeus testaceous yellow, covered with a thin cinereous pile; thorax dark brown, the sparse erect pubescence black; legs rufo-piceous; abdomen nigro-piceous, in some specimens black; wings dark brown at base, hyaline beyond the stigma.

Var. Head and thorax black; antennæ dark brown; apex of the abdomen testaceous.

Hab. Burma; Tenasserim; Borneo. ☿. *Length* 6–7; *exp.* 15–17 mm.

This species is the common dammar-bee of Burma and Tenasserim, and varies considerably in different localities. Specimens from South Tenasserim very closely approach the typical form from Borneo, but are not quite so dark.

988. **Melipona canifrons.**

Trigona canifrons, *Smith, Jour. Linn. Soc.* ii (1858), p. 51, ☿.
Melipona canifrons, *Dall. Torr. Cat.* x, p. 576.

☿. Head above and thorax somewhat thickly pubescent (often bare from abrasion), the front on each side of the ocelli with a few minute scattered punctures; abdomen highly polished and shining. Head, thorax, and abdomen jet-black, the pubescence sooty black; in certain lights the face shows a thin covering of cinereous pile; the antennæ piceous beneath; wings hyaline, sometimes slightly shaded with fuscous, the nervures testaceous.

Hab. Tenasserim; Sumatra (*Martin*); Borneo (*Smith*). ☿. *Length* 6–8; *exp.* 15–17 mm.

989. **Melipona ventralis.**

Trigona ventralis, *Smith, Jour. Linn. Soc.* ii (1858), p. 50, ☿.
? Trigona terminata, *Smith, Jour. As. Soc. Beng.* xlvii, p. 169.

☿. Head and thorax extremely minutely and closely punctured, opaque; abdomen smooth, slightly shining; head broader than the thorax, transverse; abdomen narrowed at base, somewhat clavate. Head in front, the margins of the mesonotum and scutellum, the sides of the thorax and of the median segment with short cinereous pubescence; the head and thorax black; the legs, the 2nd and following segments of the abdomen above dark chestnut-brown, basal segment above and the abdomen beneath pale testaceous white, the former sometimes with a brown spot on either side; wings hyaline and iridescent.

Hab. Tenasserim; Borneo; Malacca. ☿. *Length* 4–5; *exp.* 10 mm.

Trigona terminata, Smith, from Tenasserim seems to me only a larger form of this species.

990. **Melipona læviceps.**

Trigona læviceps, *Smith, Jour. Linn. Soc.* ii (1858), p. 51, ☿.
Melipona læviceps, *Dall. Torr. Cat.* x, p. 580.

☿. Head, thorax, and abdomen smooth and shining, the front and vertex and the median segment very highly polished. Head and thorax black; the face and clypeus covered with a thin cinereous pile; the antennæ, the clypeus anteriorly, and the legs rufo-testaceous; the abdomen testaceous, darkening to castaneous brown on the apical three segments above; wings subhyaline, brilliantly iridescent.

Hab. Tenasserim; Singapore. ☿. *Length* 4–5; *exp.* 11 mm.

A common species: builds its nest often in crevices in the brickwork of the walls of houses.

991. **Melipona smithii.**

Trigona ruficornis, *Smith (nec Lamarck), Trans. Zool. Soc.* vii, p. 194, ☿.
Melipona ruficornis, *Dall. Torr. Cat.* x, p. 583.

☿. Head, thorax, and abdomen smooth and shining, the head and face in front slightly pubescent. Black; the lower margin of the clypeus, the antennæ, legs, and abdomen rufo-testaceous, the antennæ specially bright-coloured; pubescence cinereous; the coxæ and femora of the legs and the abdomen towards the apex shaded with fuscous; wings hyaline and splendidly iridescent.

Hab. Mainpuri, North-West Provinces; Burma; Tenasserim. ☿. *Length* 3–4; *exp.* 9–10 mm.

992. **Melipona iridipennis.**

Trigona iridipennis, *Smith, Cat.* ii, p. 413, ☿.
Melipona iridipennis, *Dall. Torr. Cat.* x, p. 579.
Trigona bengalensis, *Cam. Mem. Manch. L. Ph. Soc.* xli, 1897.

☿. Head, thorax, and abdomen smooth and shining; the face in front, the sides of the thorax and of the median segment with a thick silky pile. Head and thorax black, the pile silvery; the labrum, mandibles, palpi, antennæ, and apical joints of the tarsi

with fuscous pubescence; the abdomen testaceous, darkening towards the apex; wings hyaline and brilliantly iridescent.

Hab. Barrackpore; Burma; Tenasserim; Ceylon. ☿. *Length* 3–4; *exp.* 7–9 mm.

993. **Melipona præterita.**

Trigona præterita, *Walk. A. M. N. H.* (3) v, p. 305.
Melipona præterita, *Dall. Torr. Cat.* x, p. 582.

☿. Head in front slightly scabrous, with an indistinct abbreviated furrow below the anterior ocellus; thorax and abdomen smooth and shining, the lateral margins of the mesonotum and scutellum raised, a deep transverse groove between the two latter. Black; the antennæ, the anterior and intermediate tarsi, posterior tibiæ and tarsi, and abdomen testaceous, the base gradually darkening on the apical segments; the antennæ above fuscous; the clypeus and front with a thin cinereous pile; wings hyaline and iridescent.

Hab. Burma; Ceylon. ☿. *Length* 5–6; *exp.* 12–13 mm.

I am not quite certain whether I have rightly identified this species, but specimens from Rangoon and others collected at Trincomali agree fairly well with Walker's description.

994. **Melipona lutea,** n. sp.

☿. Head, thorax, and abdomen smooth; the head and thorax covered with sparse pubescence; the abdomen shining. Pale honey-yellow, somewhat darker and browner on the mesonotum and on the tarsi of the legs; the clypeus and face in front, the cheeks, sides of the thorax and of the median segment, and the coxæ and femora of the legs with a thin soft cinereous-white pubescence only visible in certain lights; the head above and behind, the thorax, legs, and apical 2 or 3 segments of the abdomen studded with erect black hairs; wings light flavo-hyaline at base, paler towards their apical margins.

Hab. Northern Tenasserim; Karennee. ☿. *Length* 9–10; *exp.* 21–23 mm.

995. **Melipona thoracica.** (Pl. IV, fig. 13.)

Trigona thoracica, *Smith, Jour. Linn. Soc.* ii (1858), p. 50, ☿.
Melipona thoracica, *Dall. Torr. Cat.* x, p. 584.

☿. Head and mesonotum very minutely and closely punctured; median segment and abdomen smooth, polished, the latter narrow, oblong, the sides parallel. Black; the scape of the antennæ at base, the clypeus, and base of the mandibles more or less ferruginous, the latter two sometimes entirely black; a square mark on the mesonotum obscurely rufo-ferruginous; the legs in the type specimen slightly ferruginous at base, but in the majority black; abdomen black, rufo-testaceous at base; wings flavo-, in some specimens at base fusco-hyaline.

Hab. Tenasserim; Singapore. ☿. *Length* 7–8; *exp.* 19–20 mm.

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PLATE I.

Fig. 1. *Mutilla aurifex*, Smith, ♀. $\frac{1}{1}$. .... p. 34.
„ 2. *Mutilla yerburyi*, Cameron, ♂. $\frac{2}{1}$. .... p. 51.
„ 3. *Scolia procer*, Illiger, ♀. $\frac{1}{1}$. .... p. 75.
„ 4. *Liacos fulvopicta*, Cameron, ♂. $\frac{1}{1}$. .... p. 102.
„ 5. *Salius bellicosus* (Smith), ♀. $\frac{1}{1}$. .... p. 127.
„ 6. *Pompilus unifasciatus*, Smith, ♀. $\frac{1}{1}$. .... p. 168.
„ 7. *Sceliphron madraspatanum* (Fabricius), ♀. $\frac{1}{1}$. .. p. 237.
„ 8. *Sceliphron violaceum* (Fabricius), ♀. $\frac{1}{1}$. .... p. 240.
„ 9. *Sphex splendidus* (Fabricius), ♀. $\frac{1}{1}$. .... p. 243.

[By an oversight the references to the first three figures were omitted in the text, and fig. 7, instead of fig. 6, has been printed in the reference added to *Pompilus unifasciatus*, p. 168.]

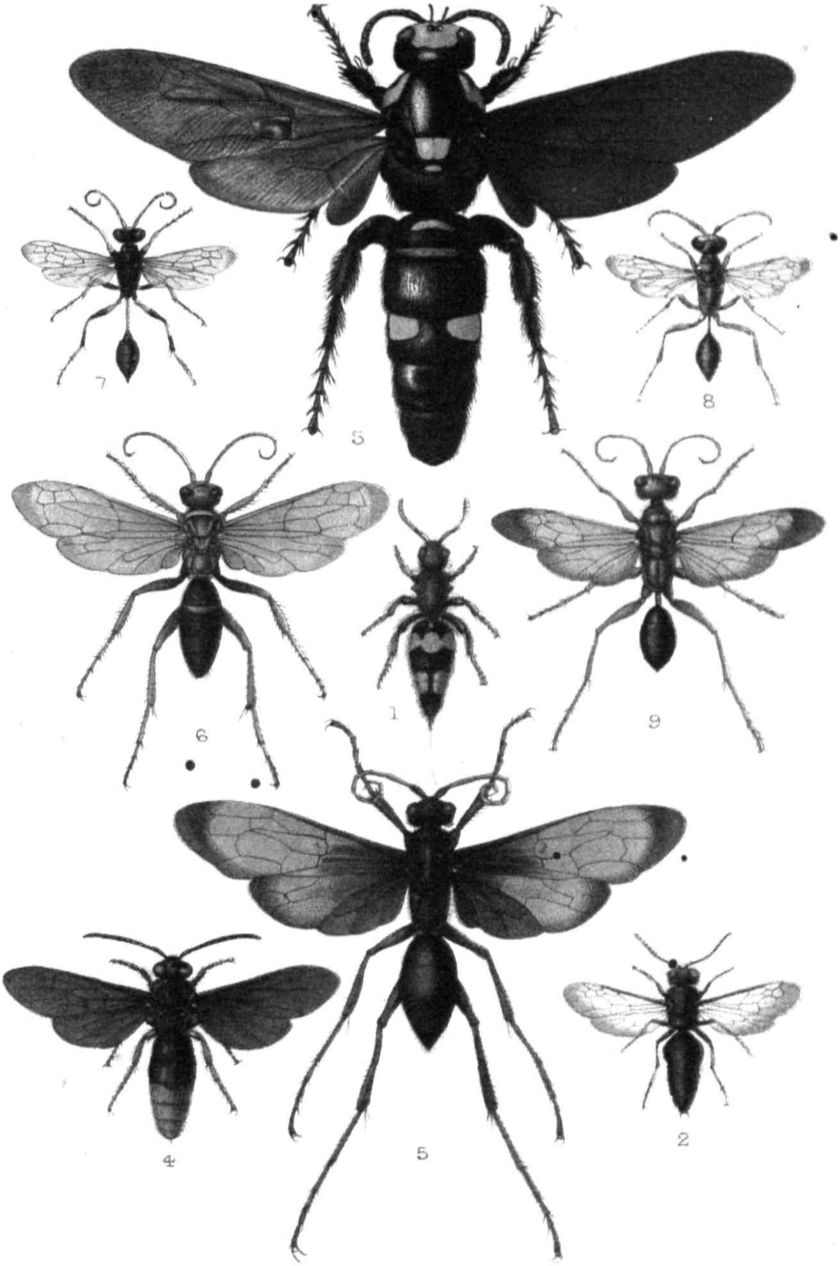

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PLATE II.

Fig.	1.	*Salius bipartitus* (Lepeletier), ♀. $\frac{1}{1}$.	p. 137.
„	2.	*Liris hæmorrhoidalis* (Fabricius), ♀. $\frac{1}{1}$.	p. 207.
„	3.	*Tachytes yerburyi*, Bingham, ♂. $\frac{1}{1}$.	p. 186.
„	4.	*Bembex lunata*, Fabricius, ♂. $\frac{1}{1}$.	p. 285.
„	5.	*Trypoxylon bicolor*, Smith, ♀. $\frac{3}{2}$.	p. 227.
„	6.	*Sphex aurulentus*, Fabricius, ♀. $\frac{1}{1}$.	p. 250.
„	7.	*Crabro quadriceps*, Bingham, ♀. $\frac{3}{2}$.	p. 327.
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„	9.	*Eumenes conica* (Fabricius), ♀. $\frac{1}{1}$.	p. 343.
„	10.	*Montezumia indica*, Saussure, ♀. $\frac{1}{1}$.	p. 350.
„	11.	*Rhynchium moelleri*, Bingham, ♀. $\frac{1}{1}$.	p. 354.
„	12.	*Odynerus sikhimensis*, Bingham, ♀. $\frac{3}{2}$.	p. 363.
„	13.	*Odynerus multipictus*, Smith, ♀. $\frac{3}{2}$.	p. 368.

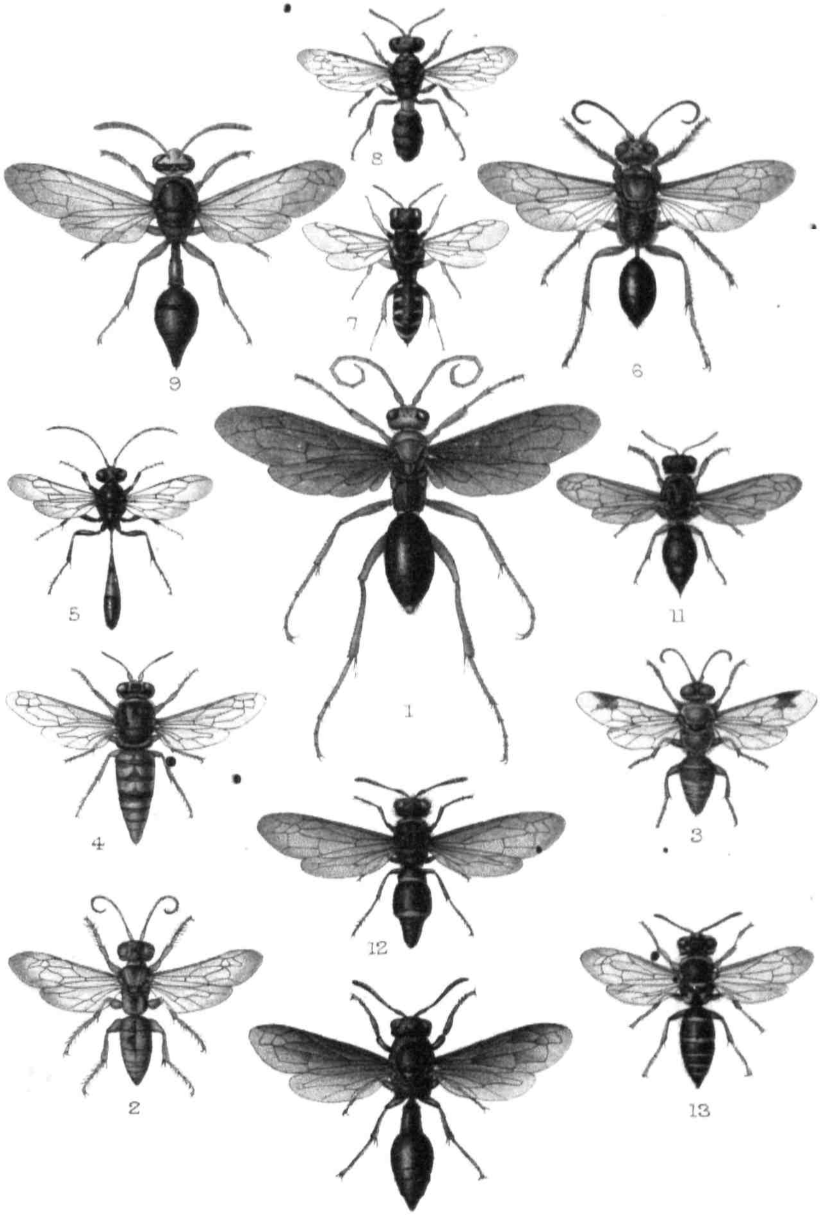

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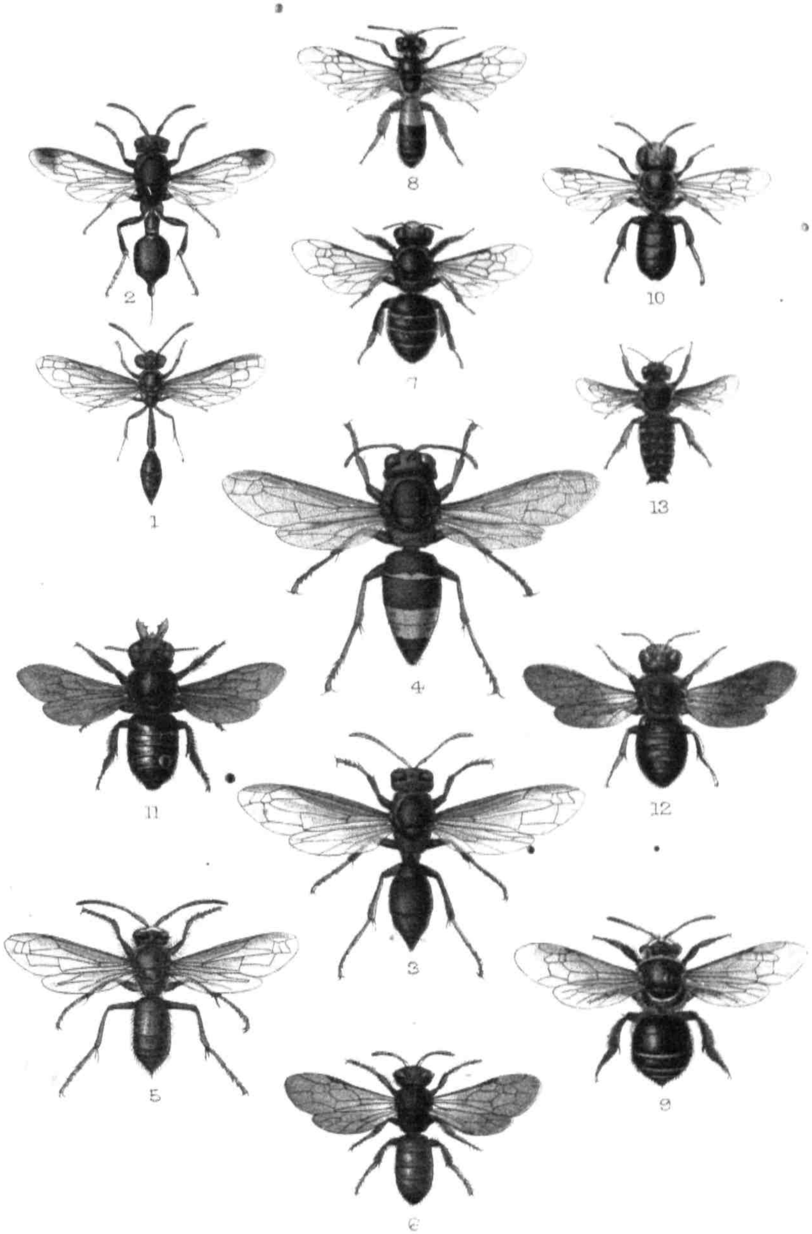
PLATE III.

Fig. 1. *Ischnogaster micans*, Saussure, ♀. $\frac{1}{1}$. .... p. 378.
„ 2. *Icaria guttatipennis*, Saussure, ☿. $\frac{1}{1}$. .... p. 387.
„ 3. *Polistes sulcatus*, Smith, ♀. $\frac{1}{1}$. .... p. 395.
„ 4. *Vespa orientalis*, Linnæus, ☿. $\frac{1}{1}$. .... p. 403.
„ 5. *Vespa dorylloides*, Saussure, ☿. $\frac{1}{1}$. .... p. 400.
„ 6. *Sphecodes fumipennis*, Smith, ♀. $\frac{3}{2}$. .... p. 417.
„ 7. *Halictus dasygaster*, Vachal, ♀. $\frac{2}{1}$. .... p. 425.
„ 8. *Andrena rothneyi*, Cameron, ♀. $\frac{2}{1}$. .... p. 443.
„ 9. *Nomia iridescens*, Smith, ♀. $\frac{2}{1}$. .... p. 452.
„ 10. *Osmia adæ*, Bingham, ♂. $\frac{2}{1}$. .... p. 468.
„ 11. *Megachile anthracina*, Smith, ♀. $\frac{1}{1}$. .... p. 473.
„ 12. *Megachile umbripennis*, Smith, ♀. $\frac{3}{2}$. .... p. 483.
„ 13. *Anthidium ordinatum*, Smith, ♂. $\frac{1}{1}$. .... p. 494.



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